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ON THE USE OF

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ON SERVICE:

WITH ESPECIAL REFERENCE TO THAT OF AN

ARMY-CORPS.

TRANSLATED FROM THE GERMAN OF

TAUBERT,

BY

HENRY HAMILTON MAXWELL,

First Lieutenant Bengal Artillery.

LONDON: JOHN WEALE.

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ON THE

USE OF FIELD ARTILLERY

ON SERVICE:

WITH ESPECIAL REFERENCE TO THAT OF AN

ARMY-CORPS.

FOR OFFICERS OF ALL ARMS.

BY

TAUBERT,

CAPTAIN AND BATTERY COMMANDANT, EIGHTH REGIMENT,
PRUSSIAN ARTILLERY.

TRANSLATED FROM THE GERMAN

BY

HENRY HAMILTON MAXWELL,

FIRST LIEUTENANT BENGAL ARTILLERY.

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TRANSLATOR'S PREFACE.

I HAVE long experienced, in my professional capacity, the want of a work treating of the tactics of Artillery; and as I have good reason to believe that others have felt the same want, I have been induced to put the treatise by Taubert of the Prussian Artillery into an English dress, being much impressed by the able manner in which that distinguished officer has handled the subject.

I need scarcely draw attention to the fact that the author has been brought up in a good school, and that he is one of a corps of officers who have always been as distinguished for their scientific and practical attainments in their branch of the service, as they have been for gallantry in the field. The great master in artillery—Frederick the Great—has left as a legacy to his country traditions which time past has confirmed, and which time future will probably never alter. Many of them are contained in the following pages, and it appears to me they could have no better recommendation than to state that they emanate from such a source.

I have endeavoured to give the *meaning* of the author's paragraphs in English, without confining myself to his *words*, believing the best translation to be a paraphrase.

For the foot notes alone I am answerable. I have made them as short as possible, as they are merely intended to spare the reader the trouble of seeking in books of reference for dates, dimensions, and measures. I have rarely, if ever, permitted myself to discuss the merits of the author's opinions, leaving them to the consideration of the professional reader.

H. H. M.

28th February, 1856.

PREFACE.

ARTILLERY has been so remarkably improved in its material since the last great European war, that in this respect it seems to be nearly perfect: its organisation has been altered, greatly to its advantage, and the troops themselves have been so much ameliorated, that they are out of all comparison more efficient than they were in former days.

Our duty compels us to acknowledge with gratitude the great solicitude which has been extended to the Arm from the Highest Quarters; and to attribute thereto the principal cause of its improvement, as this patronage gave birth to the active and scientific labours which still occupy the corps.

The field artillery especially has made, latterly, important advances, rendering it so capable of locomotion and so handy, that it is now in a position to satisfy all the exigencies which a General could expect from it as regards tactical utility.

Under these circumstances it appears requisite to turn the attention of officers exercising superior commands to the existing efficiency of the artillery, and to diffuse among other officers of all Arms practical instruction, grounded on a proper footing, in this branch of the service and in military history generally.

Books published years back on the subject of the tactics of artillery cannot be considered as applicable to the present day, for we must now look at things in a very different point of view from what the writers then did: under any circumstances, however, it is desirable that new works on the subject should be published, and such works will be more useful if they ignore that class of critics who have nothing but doubts to offer, and whose writings tend towards weakening the faith in the present order of things; for the chief duty of a practical officer is ever to employ what exists to the best of his ability. It is well, too, that they should avoid dealing too much in generalities: the application of the common rules in individual cases will render those rules all the more intelligible.

The author delivered his lectures at the Royal "Allgemeine Kriegsschule" with this idea continually before him, and it has equally been adhered to in the following treatise "On the Use of Field Artillery on Service."

The work contains all the directions and views which obtain in the Arm, to the exclusion of everything approaching to argument or unauthorised innovation.

Historical explanations, comparisons, and examples are interwoven in the text as far as seemed desirable, and for this reason—that the reader may thereby be induced to study military history, and thus many a useful hint will be gained to the advantage of the corps generally.

As the work particularly applies to the employment of the batteries of an army-corps, it appeared necessary to confine it to the limits it has attained, so as to avoid the fault above inveighed against, namely, dealing too much in generalities.

The author lays this work before his superiors and comrades with diffidence, for upon many of the points herein treated opinions still widely differ in the Arm.

He considers the use of the reserve-artillery and the employment of masses of the Arm in a general action, to be a subject of the gravest importance, and one too little discussed in treatises. They have been brought under consideration in the following pages.

If his own feelings can derive but little satisfaction from the manner in which he has treated so weighty a subject, still he must lay claim to that forbearance which has always been granted to a love of the Arm, and to the most earnest exertions to be useful to it.

TAUBERT.

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CHAPTER I.

ATTRIBUTES, OBJECT, AND REQUISITES OF FIELD ARTILLERY, ITS STRENGTH AND DISTRIBUTION IN AN ARMY-CORPS.

SECTION 1.—ATTRIBUTES, OBJECT, AND REQUISITES OF FIELD ARTILLERY.

The attributes of field artillery are its ability of firing from a smaller extent of ground, of throwing further and with greater force than other Arms. It is, consequently, the most effective Arm as regards fire, and as such may be said to be the chief representative of distant combat; on the other hand, it does not possess the requisite qualifications for close combat, as it has not sufficient tactical independence to fight through an engagement single-handed, like infantry or cavalry. On the contrary, it should always be tactically combined with either one or both of those Arms to enable it to effect its object in an engagement.

That object is three-fold: to prepare,—to support,—and to decide.

It should prepare the way for ulterior operations:—by shaking the enemy with its far-ranging fire before he comes within reach of other weapons,—by making it difficult for him to avail himself of cover,—and by engaging his artillery on an equal footing.

It should support the manœuvres of the other troops: by protecting the deployment of their columns from sudden attacks,—by drawing off the enemy's artillery fire from them,—by preceding them in their attack on the enemy,—by augmenting their fire, on the other hand weakening that of the enemy,—and finally, by forming points of support and assembly for the troops in case of their being beaten back.

It should act decisively: by concentrating its masses and silencing the adversary's artillery with a fire delivered at short range, and thus, by breaking his tactical formation, incapacitate him for resistance against an attack with the steel.*

The requisites of field artillery are, good effect and great mobility. In some respects they stand in opposition to each other, for almost every construction of piece which increases the effect requires a greater weight of metal, and, consequently, decreases the mobility; so that in general, when one of these requisites is enhanced, it is at the cost of the other. The determination of these limits is the most important question in the construction of ordnance, and forms the best criterion of field artillery. As, however, the exigencies of a campaign do not in every case require an equally great amount of mobility, it is possible to satisfy both conditions to a still greater extent by arrangements of organisation, as the construction of the material in this respect opposes no obstacle; for field artillery is naturally divisible into two primary classes, one representing the maximum of mobility, the other the maximum of effect. That which is intended to support the attack of cavalry and to make sudden movements, requires the maximum of mobility. This is horse artillery: the gunners being mounted, the teams are not overweighted, and there is a certainty of the men being at hand to serve the pieces when required; and, consequently, the pace of the guns need never be moderated on that account. Far from such being the case, the teams may develop all their capacity for locomotion applicable to artillery generally, according to the material, the strength of the cattle, and the nature of the ground.

---

* We have no word in the English language, sadly deficient as it is in military terminology, for "*blanken waffen*" or "*armes blanches.*" The one used in the text is a poor substitute.

For these reasons it is eminently calculated for great and sustained velocity, for turning movements, and for bringing a crisis to an issue; while at the same time it is capable of manœuvring to the last, even under adverse circumstances, and after a great loss of horses.

To these advantages, however, must be opposed its costly composition, its more difficult maintenance, and the great losses it is subject to in action.

Foot artillery, whose duty is to support the infantry, requires a less amount of mobility. Analogous to the infantry in the mass of the army, it forms the great bulk of field artillery. Its mobility may be increased in an engagement, or on a march, by mounting its gunners, but never to such an extent as to put it on a par with horse artillery.

An essential requisite to the good results which we may expect from field-artillery is, that it be judiciously handled in action. This applies quite as well to the smallest detachments of guns as to the largest masses of the Arm. Its tactics should correspond to those of the other Arms.

The effect of field artillery is dependent upon the construction of its material; its mobility, upon its organisation; and both upon the physical and mental training of the troops. The method of handling it is the object of this treatise.

SECTION 2.—STRENGTH OF THE FIELD ARTILLERY OF AN ARMY-CORPS* AND THE RELATIVE PROPORTIONS OF THE DIFFERENT NATURES OF ORDNANCE AND CALIBRES.

The field artillery of an army corps consists of:—

4-6 pounder foot batteries, each of	6-6 pounder guns. 2-7 pounder howitzers. 6 ammunition waggons. 4 store carts.
3 horse artillery batteries	*Idem.*
3-12 pounder batteries, each of	8-12 pounder guns. 10 ammunition waggons. 4 store carts.
1-7 pounder howitzer battery, of	8-7 pounder howitzers. 10 ammunition waggons. 4 store carts.

Total 11 batteries with 42-6 pounder guns, 24-12 pounder guns, } 66 guns,
and 22-7 pounder howitzers—altogether 88 pieces.

6 ammunition columns of 27 shot, shell, and small-arm ammunition waggons, 4 store carts, and 2 spare carriages.
1 laboratory column, of 6 waggons of the train.
1 handicraft column, of 8 waggons of the train.

Total 8 columns.

The proportions of guns to howitzers, of heavy to light guns, of foot to horse artillery may here be considered.

1. *The proportion of guns to howitzers.*

Of the whole number of pieces three-fourths are guns, one-fourth are howitzers.

Austria and ourselves have adopted these proportions, while Russia, France, and most other states have a greater number of howitzers, as many, indeed, as to amount to one-third of the whole number of pieces.

---

* The effective strength of an army-corps in the Prussian service in the field is twenty-five battalions, say 25,000 men; thirty-two squadrons, say 4,800 men; and eleven batteries, or 30,000 men with 88 pieces.

These proportions have not always obtained with us; we have a much smaller number of howitzers in the equipment of the field material of 1842, than we had formerly.

Under King Frederick the Great they amounted to one-third of the whole number of pieces. That monarch placed a great value on this nature of ordnance, and made good and frequent use of it against the well entrenched positions of his opponents. After the Seven Years' War, a number of experiments on a large scale were made, with a view to test the effect of howitzer fire against entrenchments, and the "Archives of the Officers of the Corps of Artillery and Engineers," give an interesting report of them in the sixth volume. Subsequently the king issued an order that each army-corps should have forty heavy howitzers attached to it.*

In the campaign of 1806, the army out of 576 pieces of line and reserve artillery (exclusive of battalion-guns and field mortars), had 144 howitzers, consequently only one-fourth of the whole.

After the reorganisation of 1816, the artillery of each army-corps had sixty-six guns and thirty howitzers; or almost one-third of the total number of pieces.

The reduction lately effected in the number of guns in each army-corps, by eight, fell entirely upon the howitzers, and their proportion to the total number is now between one-third and one-fourth.

---

* The following are the proportions of howitzers to guns actually employed by Frederick the Great. Mollwitz (1741.) 1-4th, Leuthen (1757.) 1-21, Zorndorf (1758.) 1-4th. In the different Prussian army-corps in September 1761. 1-7th. France, in 1758, in her campaign in Flanders, had 1-25th of the whole number of pieces, howitzers. According to another authority, however, that nature of ordnance was not definitively adopted until 1774.

In the last century the calibres of field howitzers were 18-pounder, 10-pounder heavy, 10-pounder light, and 7-pounder. At the close of that period the heavy calibres were abolished, and the light 10-pounder and 7-pounder, only retained. Both existed in the army up to 1842, when the 10-pounder was likewise abolished; for its range and effect is not so superior to that of the 7-pounder as to counterbalance the costly equipment of a heavy field gun, and especially the greater amount of transport required for its ammunition.

The importance of howitzers in a campaign has increased with the improvement of their common shell and shrapnell fire; and that importance augments the more the ground on which the action is fought, is cut up or uneven, and the more cover it affords. A large proportion of howitzers limits the enemy's power of making use of cover, adds to the effect of artillery fire, especially in village and defile combats, and increases the moral effect of that fire upon the enemy. On the other hand, these pieces require a greater number of waggons for the transport of an equal quantity of ammunition than guns.

2. *The proportion of heavy to light guns.*

Of the guns of an army-corps seven-elevenths are 6-pounders, four-elevenths are 12-pounders.

We exceed Austria and Russia in the proportion of heavy calibres; the number of 12-pounders with those Powers may be assumed at one-third of the guns.

The proportion here laid down has been frequently altered according to the principle of construction which obtained at different periods, and the views which prevailed regarding the importance of artillery fire.

In the first half of the last century a disposition to diminish the weight of the hitherto excessively heavy guns predominated. The regulations on this behalf are well worthy of remark, because they unshackled the artillery from the fetters imposed by a material destitute of mobility; they further give evidence of the wish to render the artillery more capable of manœuvring, and to endow it with that offensive character which the army proposed for it.

In both the Silesian campaigns,* we find that the field artillery consisted of 12-pounder and 24-pounder guns with various calibres of howitzers. There were three kinds of 12-pounders: the weight (of metal) of the heavy 12-pounder was upwards of 2000℔s., that of the medium as much as our present 12-pounder, but that of the light 12-pounder only 780℔s.,† being less than the present 6-pounder.

The field 24-pounder was very short, being only twelve calibres in length, and weighed 1560℔s. When we consider these weights in connection with the calibres a little closely, we find, that in the light 12 and 24-pounders there were only 65℔s. of metal in the gun to one pound in the shot, and therefore, they departed widely from the limits which are considered judicious in the present day, viz., 150℔s. weight of metal in the gun per pound in the shot, and thus in lightening their pieces the innovators had clearly gone too far.

This measure did not accomplish the desired object, and the efforts to give mobility to the guns by making them lighter in weight of metal were unsuccessful; because equally great improvements were not made in the wood and iron work of the gun carriages, waggons, and carts, in consequence of the low point at which the mechanical arts had attained in those days. Under such a system, the construction of a train material merely sufficed for the transport of the pieces from place to place, and for their wearisome movement on the field of action, but gave them no capabilities for manœuvre.

---

* 1744, 1745.

† The Prussian *pfund* is to the English pound avoirdupois as 7215·2 : 7000, or between 1-32nd and 1-33rd part heavier.

The artillery, which had in this manner gained but little as to mobility, could not follow the army across bad roads, and lost materially in the effect of its fire; for the light guns could only stand, comparatively speaking, small charges. This decrease in the effect of fire incapacitated them from performing the part which was attributed to position artillery in those days, namely, that of opening the engagement, and influencing the enemy's dispositions at long ranges. The first campaign of the Seven Years' War already dissatisfied us with the lightened ordnance: their fire was deemed insufficient, their chambers unpractical. We resolved after the battle of Rossbach,* to discard the light 24-pounder, wherein it was used for the last time.

This resolution led to an increase to the power of the fire of the artillery, a result again obtained by heavy guns and heavy charges. The necessity for this was all the more obvious, as the old excellent infantry was nearly entirely destroyed after the three first campaigns, and the numerous and well-served artillery of the Austrians, generally advantageously posted, required a powerful counterpoise; the measure, too, diminished the great casualties which the infantry suffered. It led, however, to great losses of guns in certain unfortunate engagements,† and to the consequent necessity of horsing heavy garrison guns, and of incorporating them into the field artillery.

---

* Battle between the Prussians, commanded by their king, and the allied army of the French and Austrians, in which the latter were totally defeated, November 5, 1757.

† Hohenkirche. Battle between the Prussians, under Frederick II.; *and the Austrians,* under Count Daun. The king was surprised and de*feated, October 14, 1758.*

After 1759, a decided leaning towards the employment of heavy guns prevailed, and the great augmentation to the field artillery shows that the fire of that Arm was held in greater estimation the longer the war continued.

The immediate consequences of this feeling were, the successful introduction of the heavy 12-pounder garrison gun (of 3000 lbs. weight of metal, Brummer) into the field artillery; these appeared at the battle of Leuthen,* and the construction of a field 6-pounder, twenty-two calibres long, with 1500 lbs. weight of metal, and a three pound charge.

The great irregularities which existed in those days in the construction of ordnance are evident, as we find a variation between 65 lbs. and 250 lbs. weight of metal in the piece, per pound of the shot.

Towards the end of the Seven Years' War, the following remarkable result was arrived at, namely, that we, who had given the impulse towards lightening field artillery, had returned to the heavy pieces, while all the other Powers had lightened theirs.

To this system we remained faithful up to the peace of Hubertsburgh,† when we recast the existing lightened ordnance and adopted three kinds of 12-pounders, and the heavy 6-pounder, as artillery of position. These calibres were used until the end of the century, when, however, the 3000 lbs. (or heavy) 12-pounder (Brummer) was abolished in the field artillery, in which it had existed thirty years. It made its last appearance at the battle of Kaiserslautern.‡

---

* Leuthen, December, 1757. "Journée d'honneur pour l'Artillerie Prussienne," as it has been called.

† 1763.

‡ Battle between the Prussians and the French Republicans under

In the campaign of 1806 there was a decided balance in favour of the heavy over the light guns, for, excluding battalion guns, the line and reserve artillery consisted of 216 12-pounders, 96 heavy 6-pounders, and 120 light 6-pounders.

All the foot artillery guns were heavy; they amounted to three-fourths of the whole number. The horse artillery had light pieces, forming the remaining one-fourth.

After the campaigns of 1806—1809, we abandoned the heavy guns; for, it appears, at the reorganisation of the army in 1809, the artillery in twenty-one batteries numbering 168 pieces had 126 guns, of which only eighteen were 12-pounders, and the remaining 108 were light 6-pounders. It should be stated, though, that in consequence of the deficiency of light 6-pounders there were heavy 6-pounder batteries, and even a 3-pounder battery.

At the reorganisation, in the year 1816, each army-corps had ninety-six pieces, of which sixty-six were guns, of these eighteen were 12-pounders and forty-eight 6-pounders.

The proportion of heavy to light guns was fixed at three to eight.

The greater proportion at present existing of four to seven, arises in consequence of the introduction of six 12-pounders, and the withdrawal of six 6-pounders per army-corps.

With reference to the influence of calibre in an action, it may be said, that numerous *heavy* pieces increase the effect of the fire, because they have a longer range—one more independent of the nature of

Hoche. The former were victorious, though inferior in number, and owed their success to the well served artillery defending the entrenchments. November 28 and 29, 1793.

the ground and more certain in its effect—than *light* guns can have; that their importance is on the increase, because the general tendency of the day leans towards affording a counterpoise to the greatly increased accuracy and range of small arms in all armies, and to the neutralisation of that fire by means of their very copious canister and shrapnell fire: on the other hand, numerous *heavy* guns injure the capacity of the artillery for manœuvre in the field; they lessen the velocity of operations and marches; and lastly, they require a greater equipment and more transport for their ammunition.

3. *The proportion of horse to foot artillery.*

Of the eighty-eight pieces which belong to each army-corps, sixty-four are foot, and twenty-four horse artillery, the proportion between them is therefore as three to eight. Russia keeps *nearly* to this proportion. She has adopted that of one-fourth; on the other hand, France has only one-seventh of her field pieces horse artillery.

It is well known that the horse artillery was first established in the year 1759 in the camp at Landshut, as a brigade of ten light 6-pounders; this is specially deserving of notice, as the introduction of this Arm in every instance during the Seven Years' War failed, a period at which we once more resolved on the adoption of large calibres; and it turned out that the great King was eventually destined to attain in a novel manner his object of producing greater mobility and capacity for manœuvre, an object which he fruitlessly aimed at with the foot artillery.

It is clear that the new creation was approved of by the King; for, though it was twice destroyed, at

Kunersdorf* and Maxen,† it was reorganised a third time in the year 1760, having six light 6-pounders and two 7-pounder howitzers.

In the campaigns of 1778, the number of horse artillery batteries ‡ had increased to seven, and in the year 1806, to twenty. In 1816 they were augmented to twenty-seven, at which strength they exist to the present day.

The existing apparently large proportion of horse to foot artillery, is explained by the fact that the former are not only cavalry guns, but mainly artillery of reserve.

The influence of horse artillery in tactical science may be traced to its power, when in considerable numbers, of increasing the mobility and endurance of field artillery, and consequently of augmenting the offensive element of the army.

SECTION 3.—THE PROPORTION OF THE NUMBER OF PIECES TO THE STRENGTH OF THE TROOPS.

From the known strength of our army-corps,§ we may assume that there are about three pieces to every 1000 combatants; this proportion is adhered to by most of the other large continental armies.

There are no generally accepted rules on this subject, because it is not a matter so difficult to determine, as the number and calibre of the pieces which an army requires; for, independently of the nature of the ground, which has a great influence upon this point, the predilection of an army for its existing organisation, the character of its commander, and the armament of the enemy, have to be taken into consideration.

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* Prussians against Russians. The latter were victorious. The former lost 20,000 men and 200 pieces of artillery. August 12, 1759.

† Prussians against Austrians. 18,000 Prussians laid down their arms, 1759.

‡ It has been found impossible to make use of the term "Troop of Horse Artillery," used in the British service, in consequence of the horse artillery and foot 6-pounder batteries being classified together in the course of the work as "mixed batteries," *i. e.* having guns and howitzers mixed. The term, however, "horse artillery battery," though it may sound strange, can hardly mislead.

§ *Vide* foot note, page 4.

In a country much cut up, numerous light guns are desirable; while in a flat and open one a greater proportion of heavy guns and horse artillery might be advantageously adopted; as would an excess of howitzers in a hilly country abounding with cover.

Heavy guns and numerous howitzers increase the effect of artillery fire; when such are employed, the number of pieces may be diminished.

Agreeably to these principles, the number of pieces in all armies has varied very much; but we invariably find towards the end of a campaign, that the proportion of artillery to the other arms increases; this is partly to be attributed to the fact of the effect of its fire being more highly estimated, and that the effect itself considerably increases; and partly because the number of combatants decreases in a higher ratio than the pieces.

In the two first Silesian wars* the number of pieces was between 2½ and 3 per 1000 men; it increased considerably in the Seven Years' War,† and reached, towards the end of it, to between 5 and 6. In the year 1780 the army of Frederick the Great amounted to 133,000 infantry, 38,000 cavalry, 688 position and 284 battalion pieces, making a total of 972, or 5½ per 1000 combatants.

This proportion exceeds the existing one nearly in a duplicate ratio.

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* 1744, 1745.

† 1756–1763.

In 1806 the army had 600 position and 434 battalion guns.

It is difficult to ascertain the exact proportion which obtained in 1813-1814, because the army was continually on the increase.

This can be determined, however, with greater accuracy for the year 1815, when the army under Prince Blucher of Wahlstadt consisted of four army-corps of 136 battalions, 135 squadrons, and 39 batteries; or, of 117,000 men and 312 pieces, and consequently had 2¾ pieces per 1000 men.

A numerous artillery is favourable on the defensive, it spares the other troops, it facilitates the decision of an action, but increases the train and requirements of the army.

SECTION 4.—DISTRIBUTION OF THE FIELD ARTILLERY OF AN ARMY-CORPS.

The field artillery of each army-corps is divided into division and reserve artillery. Each infantry division has two foot batteries, and each cavalry division one battery of horse artillery. Whether the batteries of the infantry divisions should be 6-pounders or 12-pounders, is a point to be decided by the General in command; 6-pounder batteries are to be preferred, if there be no peculiar circumstances in the case which would render it desirable that they should be 12-pounders, because those batteries contain howitzers, whereas the 12-pounder batteries do not, and are consequently applicable in all sorts of ground, and in every possible circumstance which may occur in action; they are more movable on the march and in action; and, finally, they are attended by a smaller waggon train, and have a greater number of rounds in their limbers than the 12-pounders. On the presumption that these views are accepted, the following will be the constitution of

A.—*The divisional artillery.*

4-6 pounder foot-batteries.
1 horse-artillery battery.

B.—*The reserve artillery.*

3-12 pounder batteries.
1-7 pounder howitzer battery.
2 horse-artillery batteries.
8 columns.

The artillery of the corps, then, is divided into two unequal parts, of which the lesser, consisting of 5 batteries or 40 pieces, is directly attached to the troops, while the greater, of 6 batteries or 48 pieces, forms the reserve.

Of the fifth 6-pounder battery, here, and elsewhere in this work, no notice is taken, because its introduction is, up to the present time, merely provisionary.*

Since the division is an independent, self-contained body of troops, provided with all three arms, it forms a tactical unity, and, consequently, requires that artillery be permanently attached to it to give it the requisite independence; the foot batteries which are attached to it should, however, suffice for the troops of the division. It therefore follows, that the regiments of cavalry which compose the cavalry of division, should have no special horse artillery attached to them. This decision is justified, when we consider that the cavalry of division is only an auxiliary, whose duty it is to support and turn to profit the successes of the infantry, and not to independently seek a point of attack.

The cavalry of division, on the one hand, should add to the offensive element of the division, always remaining attached to the infantry during an action, and being prepared to break into the enemy's wavering battalions when they have sufficiently suffered from a long-continued fire, and thus to complete the victory. On the other hand, on the defensive, it should cover the flanks and rear of the infantry, and protect them in a retreating fight from the enemy's cavalry. For these purposes, then, it requires no specially attached horse-artillery, for the cavalry only turn to account the happy moment of *à propos* in the infantry engagement, and do not bring on that crisis themselves.

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* The fifth 6-pounder battery has just been definitively adopted: vide *Times*, February 25, 1856.

General Gessler, in the battle of Hohenfriedburg,* and Major von Sohr, in the battle of Möckern,† handle the cavalry in this calm and patient manner, being ever ready to support the infantry: they did not permit themselves to be diverted from their task by any independent enterprises, but took advantage of the favourable moment to break in upon the enemy's infantry with swiftness and energy, and thereby gave a bright example to future generations of the proper use of the cavalry of division.

It is quite otherwise with *the cavalry division* of an army-corps. This forms, like the infantry division, a great tactical unit, whose duty it is to form a strong reserve endowed with great mobility.

In order to furnish it with the necessary capability for independent combat, especially to strengthen its power of fire for offensive and defensive operations, it has artillery (one horse artillery battery) permanently attached to it.

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* Prussians against Austrians allied with Saxons. General Gessler, passing through the Prussian infantry at the head of the cavalry, took 4000 prisoners, 66 colours, and a large proportion of the whole of the guns taken in the battle, viz., 60; June 3rd, 1747.

† French against the allied Russian and Prussian armies. The latter were defeated, April, 1813. Another battle was fought on the same spot, between the French and the allies, October 14th, 1813.

Let us now see of what the artillery of reserve consists. We find here re-united the whole mass of the heavy guns, the howitzer battery, and two thirds of the horse artillery. As the heavy guns and the howitzers represent the maximum effect of fire, and the horse artillery the maximum of mobility, we are right in saying, that the latter contains all the elements necessary to make it a strong and active reserve, ready to support or to interfere decisively in the fight.

CHAPTER II.

PRINCIPLES OF THE TACTICS OF ARTILLERY.

SECTION 5.—CHARACTERISTIC OF THE TACTICS OF ARTILLERY.

THE tactical formations of each Arm must correspond to its peculiar nature. Infantry and cavalry consist of individual combatants, either separated or united, both making more or less use of steel and fire arms; these Arms require, therefore, three formations for action: the extended order,—line,—and column. With artillery, the chief element of the Arm is made up of material, and the use of steel arms is only secondary. An engagement in extended order, which could only be one of single pieces, is inadmissible; and the column of manœuvre is not used as a battle formation, but only as means to concentrate, move, and deploy, the larger masses of the arm.

Consequently, unlike other Arms, there is but one battle formation open to it, the deployed line; and herein, as well as in the peculiar movements necessary from the construction of its material, lies the characteristic of artillery tactics.

SECTION 6.—FORMATION OF FIELD ARTILLERY INTO INDEPENDENT BODIES.

The independent bodies of field artillery are batteries and columns.

1. *The battery.*

The battery, at the present day, is in all armies the tactical unit of field artillery, and answers to the battalion in the infantry and to the squadron in the cavalry. It consists of pieces of artillery and waggons.

The number of pieces in a battery, according to the equipment of 1842, is eight.

As the batteries of the material of 1816 only appear in the field reserve, no further notice will be taken of them in these pages, but it is everywhere assumed that the army-corps is provided with batteries of 1842.

In other armies the number of pieces varies between 4 and 8. It is in Switzerland 4, in France and England 6, in Austria, Bavaria, Wurtemburg, Saxony, Hanover, Sweden, Belgium, the Netherlands and Russia 8.

The number 8 appears to be the most appropriate, because from a battery of that strength we may expect a considerable effect of fire, its command is exercised with sufficient ease, and it permits of sections of half batteries and divisions, whereby its evolutions are facilitated.

The formation of batteries of mixed or like pieces gives rise to the classification of mixed, gun, and howitzer batteries.

a. *The mixed batteries.*

The use of howitzers and guns together in one battery is one of very ancient date, and is adopted by all artilleries on account of its well recognised advantages. In our service the* 6 pounder foot and horse artillery batteries are "mixed." This species of battery has the great tactical advantage of being independent to the greatest possible extent, and of being adapted to every nature of ground and circumstance of combat; it cannot, however, give the fullest effect of fire of which the two natures of ordnance are capable, for in any given position, it might at one moment be desirable to employ guns and at another howitzers; we should not fail to remark that the tactical advantage outweighs the artilleristical.† As a proof of how generally this is recognised, we may state that the whole of the field batteries of France, England, and Austria are mixed batteries, as are those of Russia,

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* I append a Table, showing the nature of the Prussian pieces, in comparison with those in the British service.

PIECE.	LENGTH IN.			DIAMETER OF.		CHARGE	WEIGHT.		
	Calibres.	ft.	in.	Shot or Shell.	Bore.				
				in.	in.	lbs.	cwt.	qrs.	lbs.
1 Prussian 6 pr. Gun . . .	18	6	6.6	3.6	3.7	2.6	9	3	7
2 Prussian 7 pr. Howitzer .	6—7			5.66	5.83	1.95 .49	10	0	24
3 British 9 pr. Gun	17	6	0	4.117 4.082	4.2	3	13	2	0
4 British 24 pr. Howitzer .	10	4	8.6	5.39 5.84	5.72	2.5	12	2	0
5 British 6 pr. Gun (Lt.) .	16	5	0	3.584 3.550	3.668	1.5	6	0	0
6 British 12 pr. Howitzer .	10	3	9.2	4.540 4.505	4.580	1.25	6	2	0
7 Prussian 12 pr. Gun . . .	18	7	0.6	4.42	4.67	4.55	20	2	0
8 British (M) 12 pr. Gun .	17	6	6.6	4.540 4.505	4.62	4	18	0	0

† This word will be found in no dictionary, but it would be difficult to convey its obvious meaning without a roundabout explanation. Analogously formed words are abundant in our language. These reasons appear, with all due deference, to warrant its introduction.

with the exception of some Licorne * batteries. In mixed batteries there are fewer howitzers than guns. They amount in England to $\frac{1}{6}$, in our service $\frac{1}{4}$, in Austria $\frac{1}{4}$, in France $\frac{1}{3}$, in Russia between $\frac{1}{3}$ and $\frac{1}{2}$, of the whole number of pieces. Howitzers make the battery more adapted to uneven ground, such as abounds in cover; they increase the moral effect of the fire on the enemy, and form a desirable contingent in an advance or rear guard, and in divisional batteries which are intended to act independently (of other artillery) in every nature of ground.

b. *The howitzer batteries.*

In each of our army-corps we have a 7-pounder howitzer battery of 8 pieces.

Russia, Sweden, Bavaria, and Belgium have similar howitzer batteries. They have the advantage of affording a ready reserve of howitzers in all those cases, where a concentrated shell fire may be desirable; they form, likewise, an important component part of the artillery of reserve, and may under peculiar circumstances be of the last advantage—circumstances which may easily occur, and which require the sudden concentration of howitzers from different points of the field of battle.

c. *The gun batteries.*

In each army-corps we have three 12-pounder batteries of 8 guns each.

Sweden, Belgium, and Sardinia have similar batteries.

They have the advantage of giving a powerful and grazing fire, commanding the plain in their front to a wide range, and are peculiarly adapted, in consequence of their superior round shot fire, to engaging the enemy's artillery, and to arming intrenched positions. Their powerful case and shrapnell fire proves them to be admirably suited to act against large masses of troops in the final struggle of an engagement.

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* A Licorne (Fr.), Einhorn (Ger.), or Unicorn (Eng.), is a species of long howitzer in use in the Russian service, not greatly differing from the modern elongated howitzer.

On account of these advantages they become the centre of gravity * of the reserve artillery; but they require even and open ground before them, and are of less general utility than mixed batteries.

2. *The columns.*

The field artillery columns consist of—

Ammunition columns of 33 carriages.
Laboratory columns of 6 carriages.
Handicraft columns of 6 carriages.

The ammunition columns

afford the nearest source of supply of ammunition, not only for the artillery, but for the infantry and cavalry, and accompany them in the field.

Besides the requisite shell, case and small-arm ammunition waggons, each ammunition column has several spare carriages to replace disabled ones, as well as store carts and pioneer tool carts containing necessary stores.

They follow the army at a distance of one day's march, and are (partially) drawn nearer to it when a serious engagement is anticipated, and when a large expenditure of ammunition may be looked for. Section 13 contains further remarks on this subject.

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* This expression is, perhaps, not often applied to artillery in English, but it is so graphic as to induce me to let it stand as in the original.

The laboratory columns and the handicraft columns are for the purpose of preparing ammunition in considerable quantities, and of repairing disabled gun carriages, limbers, carts, and like portions of the equipment. They follow the army at a greater distance than the ammunition columns, and establish laboratories and workshops in protected situations.

SECTION 7.—PRINCIPLES OF THE EVOLUTIONS OF ARTILLERY.

A.—*Principles of the evolutions of a single battery.*

a. The manœuvring portion of the battery consists of its pieces only; the waggons are not an integral part of the manœuvring body, they are not directly attached to the pieces in action, but move in a separate detachment.

Herein our batteries differ from the English, French Austrian, Russian, Bavarian, &c., in which each piece is accompanied in action by an ammunition waggon, which forms with it an inseparable adjunct.

In consequence of such an arrangement, a line of waggons is formed in a second rank, which closely follows the pieces, and which in action is placed behind the limbers.

In our method, the movements of the batteries in action are more simple and independent, and the losses from the enemy's fire less, an advantage upon which more stress should now be laid, in consequence of the introduction among the infantry of almost all armies, of explosive projectiles:* it has this disadvantage, however, of complicating the composition of the ammunition in the limbers.*

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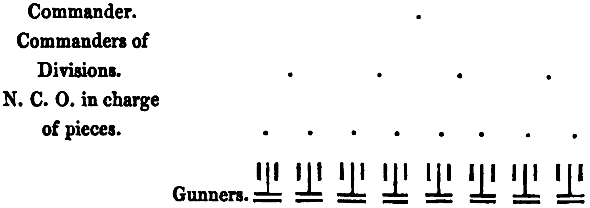
* Is this the case? I find no account of infantry explosive projectiles in a treatise on arms under the title of "Die Waffenlehre," published at

b.—*Position of the battery in line.*

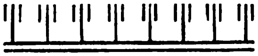
The battery, when in line, will be either at open or close order.†

Horse artillery battery.

In open order.



In close order.



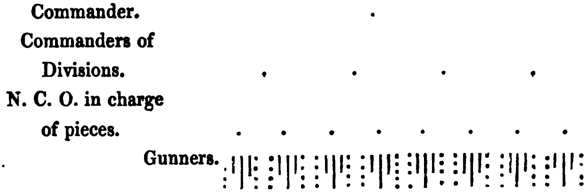
Berlin in 1855, and yet it contains two or three sentences and allusions which would go to support the opinion that such had been adopted by the Prussians, and that it was not thought desirable to give an account of them to the world. Our noble allies the French, who are first in everything like improvement, do not appear to make use of such projectiles.

* Our author forgets to notice another very great disadvantage of such an arrangement, namely, the very probable contingency of the waggons not being at hand when required. If cover be available, let the waggons take advantage of it, but in every case let them be close at hand. Completely to separate them from the battery is, in nine cases out of ten, to ensure their not being at hand. As to cover, it is, according to my experience in flat countries, rarely available. A good arrangement, when possible, is to draw the waggons up in line on the flank and a little in rear.

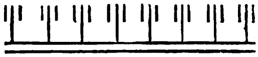
† The word "order" applies all through this work to the interval between two guns, not to the distance between two sections of a battery or batteries.

Foot artillery battery.

In open order.



In close order.



The pieces stand perpendicular to the alignement, the howitzers on the right flank.

They are numbered from right to left, without reference to the nature of the piece.

Two pieces form a division, two divisions a half battery.

The intervals for action are 20 paces* from centre to centre; up to 1812 they were only 12 paces, but were afterwards increased to 20, on account of manœuvring with the prolonge.†

Full intervals should always be kept when the battery deploys for action or moves under an enemy's fire. They facilitate the evolutions and movements with the prolonge, as well as diminish the effect of the enemy' fire.

The close intervals of five paces from centre to centre, are not to be taken under an effective fire from the enemy, but only for short periods, when necessary, in concentrating to the front, in passing through a defile, when troops are closely massed, or to avoid impracticable ground.

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* The pace is 30 English inches very nearly.

† The long-chain or prolonge is 22½ feet long, dividing into two branches, by which it is fastened to hooks on the axletree bed; it passes through a stirrup at the end of the perch of the limber. The other end has a hook, whereby it is fastened to an eye at the end of the trail.

The length of a light field piece, from the heads of the leading horses to the muzzle, is 19 paces; of a 12-pounder, 24 paces. To these lengths must be added 4 paces in the foot and 9 paces in the horse artillery, for the ground occupied by the gunners in two ranks.

The commander is posted at 20 paces in front; behind him, at 2 paces distance, is a trumpeter; the commanders of divisions are 2 paces in front of the non-commissioned officers, and the latter are 2 paces in front of the leaders of their teams.

The gunners in the foot artillery at open order stand on each side of their pieces; in close order in two ranks behind the muzzle. Those of the horse artillery are in two ranks in rear of their pieces in either case.

c.—*Movement of the battery in line.*

Pace.

The paces of the foot artillery are the walk, the trot, and the gallop; the horse artillery use the same, with the addition of the charge.

The trot is, however, the pace usually employed by artillery in the quicker movements, as well as in evolutions, or in gaining ground on the field of battle.

It is, therefore, the most important pace for the artillery.

At a walk, foot and horse artillery travel over 125 paces in a minute.*

At a short trot the gunners can accompany their pieces for several hundred paces without mounting.

The pace should be moderate, and not exceed 210 paces per minute.† It is requisite to see to the men in this sort of movement, lest they should be exhausted and incapable of serving their pieces when required to do so.

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* 3½ miles per hour. † 6 miles an hour.

In longer distances the gunners mount.

This is done in action at the word "Gunners—for action—mount," and on the march by forming the order of march.

With the men mounted, the foot artillery at a trot travels over 240 paces in a minute.*

The trot in the horse artillery is the same as that in the cavalry, 300 paces in a minute.†

The gallop is only employed when it is desirable to gain more ground in a short space of time than the trot admits of.

Foot artillery gallops when deployed into line, for the purpose of taking up a position for action.

Horse artillery gallops in taking ground, in deployments, and other evolutions.

The pace should not be too fast, and may amount to 500 paces a minute.‡

In advancing to come into action, the horse artillery charge.

Its pace depends upon the strength of the horses and the nature of the ground; it averages about 600 paces a minute.‖

Dressing in line

in open order is on the centre, on the fifth, or piece of direction. In close order, by the right.

Taking close order§

is done on a flank or on the centre; taking open order from the right or left, or from the right and left. Under an enemy's fire the intervals are not to be closed.

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* Nearly 7 miles an hour. † 8½ miles an hour.

‡ 14 miles an hour. ‖ 17 miles an hour, or half a mile in 1′ 45″

§ *Vide* foot-note † at page 23.

The diagonal march

is used, as by other Arms, to gain ground to the front and flank.

Retiring

is done, at open order, by reversing by pieces; at close order by the inwards about wheel of divisions, half batteries, or batteries.

Wheeling.

The flank pieces move at an increased pace. Dressing and intervals are regulated by the pivot piece. The wheels may be made preserving or altering the intervals, thus passing from open to close, or close to open order. The inwards about wheel; is performed by batteries in line at close order only.

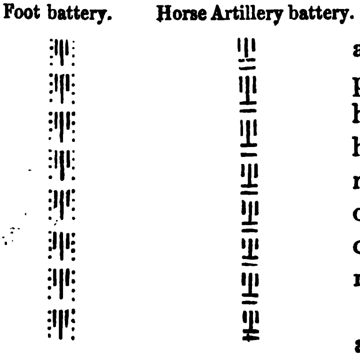
Breaking off from line

by divisions or half batteries, is necessary when a battery advancing in line meets with an obstacle when under fire, under which circumstances the intervals should not be closed.

d. *Formations in column.*

The various column formations are:—

1. *Column of subdivisions.*



The pieces follow one after the other, with four paces distance from the heads of the leading horses of one piece to the muzzle of the preceding one, or to the rear ranks of the gunners when they march behind their pieces.

The gunners of the foot artillery march on the right and left of their pieces; in the horse artillery they march in two ranks in rear of the muzzles.

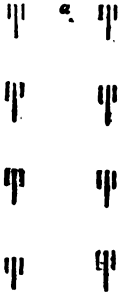
A battery may advance in column of subdivisions or of any other section from the right or left.

The column of subdivisions is formed by the taking ground by individual pieces at the word of command: "Column of subdivisions—right (or left) take ground!" the flank piece remaining straight to its front; or it may be formed by breaking off by pieces from a flank.

2. *Columns of divisions.*

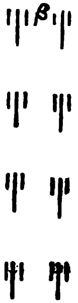
There are four kinds of this column, according as the distances and intervals are combined:

The distance column in open order of divisions.



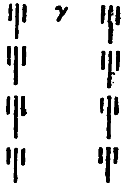
Intervals	. . .	20 paces.
Distances,	Light B. .	21 „
„	12-pr. B. .	16 „
„	H. A. B. .	12 „

The distance column in close order of divisions.



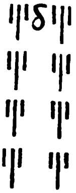
Intervals	. . . .	5 paces.
Distances,	Light B. .	17 „
„	12-pr. B. .	12 „
„	H. A. B. .	12 „

The close column in open order of divisions.



Intervals, 20 paces.
Dist. 4 paces.

The close column in close order of divisions.



Intervals 20 paces.
Dist. 4 paces.

These columns are formed from line as follows:—

α. By the wheel of divisions, retaining the intervals at the word:

"Battery by divisions—right (or left) wheel!"

β. By the wheel of divisions, altering the intervals at the word,

"Battery to the right (or left) take ground!"*

γ. By two square turns, at the word:

"Battery will advance from the right (or left) in column of divisions!"

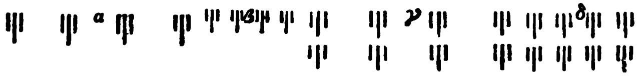
The leading division advances, in light batteries forty paces, in 12-pounder forty-five paces, and in horse artillery batteries fifty paces; the remaining divisions cover at the word right or left turn.

δ. Like the preceding, but afterwards closing the intervals. Further, *γ* and *δ* can be formed from *α* and *β* by taking close order; all the columns may be formed by breaking off from a flank, but this method retards the formation.

3. *Columns of half batteries.*

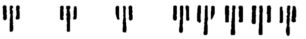
There are four natures, as there are of columns of divisions.

The distance column in open order of half batteries.	**The dist. col. in close order of half batt.**	**The close column in open order of half batteries.**	**The close col. in close order of half batt.**



Intervals, 20 paces. Distance, 4 paces.

Int. 5 paces. Dist. 4 paces.



Intervals	**20 paces.**	**Int.**	**5 paces.**
Dist. with		**Dist. with**	
Light B.	**61 „**	**Lt. B.**	**57 „**
12-pr.B.	**56 „**	**12-pr. B.**	**52 „**
H. A. B.	**52 „**	**H.A.B.**	**62 „**

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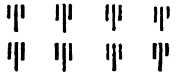
* Take ground ?

In the formation of columns of half batteries the words of command are analogous to those for columns of divisions.

4. *Double columns of divisions from the centre.*



The second and third divisions form the front of the column. The first follows the second, and the third the fourth division, with four paces distance.

Should it be necessary still further to reduce the front, without closing the intervals, the outer flank pieces break off, and follow the inner ones of their divisions, thus forming a double column of subdivisions from the centre, of which the two central pieces of the battery, the fourth and fifth, compose the front.

e. *Movements in column.*

The dressing in column, when marching to the front, is by the right, when to a flank by the side nearest to the front.

The advance, closing and opening the intervals, as well as the diagonal march, are performed in the same manner as in line.

In retiring, at open order, the pieces reverse singly; at close order, the divisions or half batteries inwards about wheel.

In advancing or retiring, if the column is to change direction, the leading section wheels on the alignement, the remainder follow its track.

Closing or opening the columns of divisions or half batteries may be done from the rear, as they have been above explained from the front.

Increasing the front of a column, as from column of division to column of half battery, is effected by moving up the flank divisions: the reverse is done by breaking off.

The distance columns may be changed into close columns by the closing up of the rear on the front; and inversely, the close columns into distance columns by taking full distance.

Bringing the rear to the front in succession, in open columns, is done through the intervals; on the other hand, in close columns by two square turns to the flank and front.

f. *Deployment from column into line.*

1. *From column of subdivisions*

by the taking ground of individual pieces to a flank, or, by moving up diagonally to the front.

2. *From column of divisions,*

from the distance column in open order, α:
  by the simultaneous wheel of divisions to a flank:
from the close column in open order, β:
  by the taking ground of all the divisions to a flank and a subsequent moving up to the front of the rear pieces.

Both the columns α and β may be deployed into line by an oblique march on the leading divisions or by successive wheels of the divisions into the alignement of the leading division.

From the close column at open order, γ:
  from the halt, by deployment; and on the move, by an oblique march to the front:
from close column in close order, δ;
  in the same manner, but opening the intervals during the movement.

3. *From column of half batteries*

analogously to the above, at the word of command of the commander of the half battery, who is the senior division officer.

4. *From double column of divisions from the centre* on the move, by right and left oblique; from the halt by two square turns.

g. *Inversion.*

Inversion is opposed to military feeling, and frequently creates disorder; it is, therefore, to be avoided as much as possible.* Should it, however, be necessary to form line from column in order to open fire immediately, artillery should choose the evolution which attains the object the quickest and take no account of the inverted order.

B. *Principles of the evolutions of several batteries.*

a. *Position, dressing, pace, movements in line.*

Two or three batteries form a regiment.

Two regiments under one commander receive the denomination of "Artillery."

Horse and foot artillery are not formed together into one regiment.

The batteries of a regiment stand in the order of their numbers from right to left.

Should a regiment be formed of foot batteries of different calibres, the 12-pounder battery takes the right, when the ground and tactical considerations permit.

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* In the French service no account whatever is taken of inversion. In the drill book of that service I find on this subject:—"In the three formations of column, line, and battery (for action), no account whatever is taken of inversions. The simplest and promptest formations are exclusively adopted. This principle extends to all the pieces of a battery while manœuvring, as well as to batteries themselves in evolutions. These batteries, when united, are thus assimilated to the pieces of a single battery, and their numbering varies, like their position, in column or in line. This method is simple, there are no exceptional cases, and it presents no difficulty in practice."

There are no special battery intervals; but the interval between two batteries in line is that which is usual between two pieces.

The dressing in line with three batteries is by the centre, with two by the right, whether in open or close order.

The paces and rules regarding the march in line, are the same as for a single battery.

The march in line is the most difficult, as it is the most important movement; for on it depends the coming into action by long lines of artillery to the best advantage.

The mounting of the gunners in action and the use of the prolonge, are the same as in single batteries.

The closing the intervals of a whole regiment in line to a flank, or on the centre is not practised; but the batteries close in individually.

The same holds good with opening out to full intervals.

The diagonal march and retiring are the same as with a single battery.

Wheeling in line is performed by the pivot battery as with a single battery; the remainder trot straight to the front, and wheel when they have reached the proper intervals.

The breaking off of single divisions, half batteries, or batteries is done from line, when necessary, at the word of their commanders.

b. *Column formations with a regiment.*

1. *Regimental distance column*

in divisions, half batteries, or batteries.

The individual sections keep full distance, so that line may be formed by a simultaneous wheel.

This and all the other columns may form at close or open order.

It is formed from line by the wheel of each section, or by breaking off from a flank.

2. *Regimental close column*

in divisions, half batteries, or batteries.

The individual sections cover the leading sections at four paces distance, in column of divisions or half batteries; and at fifteen paces distance in column of batteries.

It is formed from distance column by closing up or in forming the column from line.

3. *Regimental contiguous columns*

in divisions or half batteries.

The batteries are separately ranged in columns of divisions or half batteries, their leading sections being in line. Between the batteries there is only the usual interval of one piece.

This column is formed by advancing the heads of the distance columns of divisions or half batteries of the regiment, the division or half batteries are thus in close order.

Further, it can be formed by closing in the columns of divisions or half batteries of the individual batteries. The closing may be on a flank or to the centre. The battery upon which it takes place advances thirty paces and halts. The remainder take the ground to the right and left.

c. *Movements in regimental column.*

They are generally made in a similar manner to that prescribed for a single battery.

Closing the intervals of a close column is as much as possible to be avoided, and the more so the greater the number of the batteries. It must be confined to cases of absolute necessity, and for the shortest periods.

Closing in to close column and retaking full distance is executed as with a single battery. In like manner bringing the rear to the front by sections in succession, is done through the intervals or by two square turns, according as the batteries are in open or close order.

d. *Deployment of the regimental column into line.*

1. *From regimental distance column*

in divisions, half batteries, or batteries:

a. By the simultaneous wheel of all the sections to a flank.

b. By successive wheels of each section into the alignement of the head of the column; or

c. By the oblique march of the sections up to the alignement of the head of the column.

2. *From regimental close column*

in divisions, half batteries or batteries:—

(a.) From the halt: by deployment.

(b.) On the move: by advancing the sections up to the alignement of the head of the column.

3. *From regimental contiguous column*

in divisions or half batteries.

(a.) By deployment.

The battery upon which the deployment takes place deploys on its own ground, advances 30 paces and halts; the remainder take ground to the right (or left) until they have gained the full battery intervals, and deploy by a movement to the flank.

(b.) By opening out the battery columns, and afterwards simultaneously deploying.

The regiment takes open order, by taking ground to the right or left.

The battery of direction advances 30 paces and halts, the remainder take full deploying intervals of 140 paces by taking ground to the right (or left).

The remainder of the deployment is done from the halt by two square turns or by an oblique movement.

SECTION 8.—USE OF COLUMN FORMATIONS WITH ARTILLERY.

The artillery use the column formation in three cases:—

1. On the march.
2. In rendezvous.
3. For manœuvre.

1. *The column of march*

is either a column of subdivisions or a close column of divisions in close order.

In the column of subdivisions from the right or left, the pieces follow each other according to the order of their numbers, then come in succession the ammunition waggons, store carts, field forge, baggage waggons, spare men and horses, and a rear guard to preserve discipline on the line of march.

It is in most general use, because in that order every kind of ground may be passed over without altering the formation; it is likewise the least fatiguing to the men and horses.

The close column of divisions, in which the pieces of each division and every two waggons march abreast, has, it is true, the advantage of reducing the length of the column by one half, but it is not practicable on all roads, and is the least adapted both to men and horses.

In narrow ways, in passing bridges, as well as defiles, villages, and towns, it entails checks, breaking off and trotting up to the front.

Batteries when marching alone form in column of subdivisions; on the other hand they form in column of divisions, if attached to other troops, if a curtailment of the length of the column is desirable, and if the breadth of the road permits it.

2. *The rendezvous columns.*

It is first necessary to remark, that it is always desirable in positions of rendezvous, that the intervals should not be close; the batteries are thus more advantageously formed, because the pieces may reverse and the divisions may take ground to the right or left, thus securing the mobility of the battery in every direction.

The rear sections are always closed up to the front ones.

The front of the column should bear a due proportion to its depth.

Each battery should keep its waggons close to it, but the front of the pieces should be clear of them.

The mass should be able to deploy with facility, and permit of single batteries being advanced without destroying the formation.

Batteries of division in rendezvous positions are posted at 30 paces in rear of the division in close column in open order of half batteries (§ 7. A. d. 3. γ); the *waggons* in rear in like formation.

The artillery of reserve in rendezvous positions is posted behind the infantry or cavalry of reserve, in regimental contiguous columns of divisions or half batteries (§ 7. B. b. 3).

The waggons of each battery in like formation.

The adoption of columns of divisions or half batteries depends upon the breadth and depth of the ground, and upon the formation of the other Arms.

No formation so well meets every requisite as regimental contiguous columns.

3. *The column of manœuvre.*

Its advantages are: concentration of a great number of pieces in a small space, facility for command and taking advantage of cover;—its disadvantages on the other hand are: the sacrifice of a readiness to open fire, and the exposure to greater loss from that of the enemy.

On account of the latter disadvantages, artillery should avoid column formations within reach of the effective fire of the enemy, when cover is not available.

Should, however, cover be available, column formation is an excellent method of approaching the enemy's position unseen, it thus advances to the attack with the greater effect.

The formation selected should be as simple as possible, and capable of an easy and safe deployment.

Single batteries in action seldom make use of this formation, line being with them the rule.

Single batteries, however, assume the column formation when the ground, the position of our own troops, or the possibility of approaching the enemy under cover, admit of it, a point to be determined by the commander of the battery.

For advancing into action,

the battery should be either in close column of divisions at open order (§ 7. A. d., 2. γ.), or of half batteries (§ 7. A. d., 3. γ.); according to the extent of the front of the troops, which the artillery follow. It should be formed with its inward flank in front; that is, *left* in front when line is to be formed to the *right* of the troops, and *right* in front when it is to be formed to the *left* of them.

These and all columns of manœuvre must be in open order; for a close column in close order is objectionable as a column of manœuvre, and is totally inadmissible under an enemy's fire. It should merely be formed for a moment in passing obstacles.

The battery forms in double column of divisions from the centre (§ 7. A. d. 4.), when in advancing it is requisite to break off by divisions; and in double column of subdivisions, in passing a defile, in order to form line quickly to the right and left of the front.

For flank movements,

distance columns of divisions (§ 7. A. d. 2. β.), formed by taking ground to the right (or left), in close order are the most appropriate formations. They can be quickly formed and as quickly deployed, and a slight rise of ground or troops in position may easily hide the pieces from the enemy's sight.

Should the flank movement be made under the enemy's fire, distance columns of divisions in open order (§ 7. A. d. 2, α.), should be employed.

For regiments or larger masses of artillery,

the column formation is the usual one in advancing into action, and is indispensable for the Artillery of Reserve if it has to advance through an engagement, or in ground cut up by hollow ways; for under these circumstances, it cannot advance in line, but must deploy after having passed through the fight and other obstacles, having thus gained open ground.

In such cases taking a column under an enemy's fire is advisable.

It must be left to the judgment of the officer in command, which is the most appropriate formation according to time and circumstances.

In a regiment composed of two batteries, the close column in open order of half batteries (§ 7. B. b. 2.), gives a desirable proportion of front to depth.

For a regiment composed of three batteries, on the other hand, the regimental close column in open order of batteries is to be preferred for the same reason.

Should a regiment advance immediately into action from a position of rendezvous, the formation of regimental contiguous columns of divisions or half batteries is to be adopted, and after reaching a free space it should deploy.

For flank movements of a regiment formed in line, the distance column in open order of divisions is the best formation (§ 7. B. b. 1.).

CHAPTER III.

FORMATIONS OF ARTILLERY, PREVIOUS TO AND IN AN ENGAGEMENT.—POSITIONS AND MOVEMENTS OF ARTILLERY IN AN ENGAGEMENT.—KINDS OF FIRE OF FIELD ARTILLERY.—MODE OF CARRYING ON THE FIRE IN THE BATTERY.—CONDUCT OF THE AMMUNITION COLUMNS.—CONDUCT OF THE ESCORT.—CONDUCT OF ARTILLERY AFTER AN ENGAGEMENT.

SECTION 9.—FORMATIONS OF ARTILLERY, PREVIOUS TO AND IN AN ENGAGEMENT.

1. *The forced march formation.*

This is a method of enabling foot artillery to move at an increased pace on the march.

It may be adopted by batteries of all kinds, equipped with the material of the year 1842; thus forming mounted artillery, by using the waggons to carry the men. It is not in use with the horse artillery.

In this formation the battery is divided into two parts.

The first part is composed of:

in 6-pounder foot batteries: the pieces, the waggons and 60 gunners.

in 7 and 12-pounder foot batteries: the pieces, 8 waggons and 72 gunners.

The second part of:

in 6-pounder foot batteries: the store carts, spare men, artificers, and spare horses;

in 7 and 12-pounder foot batteries: the same, with the addition of 2 waggons.

The forced march is only made by the first part of the battery, during which the men are mounted, three being seated on each gun (or howitzer) and waggon limber, and three on each hind box of the waggons. Each waggon immediately follows its piece.

The second half of the battery, with the store carts, follows at a walk without altering its formation; the men do not mount, but march alongside of their waggons carrying their knapsacks.

The forced march formation is not adopted on the usual marches of relief. It should not be assumed in order to get over the ground quickly to no purpose, nor even to excite a spirit of emulation with the horse artillery; it should only be employed, when tactical considerations justify increased exertion on the part of the teams.

This may occur, either on a forced march before an action, in turning an enemy's flank, or in advancing foot batteries from the reserve.

The battery may move at an increased pace over half or a whole mile,* changing it to the walk or trot according to time and circumstances.

This formation is, consequently, merely a method of conveying a foot battery close to the spot where it is to come into action. This object being attained, the battery assumes its normal formation for action.

2. *The normal formation for action.*

The normal formation for action is assumed by all foot and horse artillery batteries, when about to go into action.

The battery is divided into three parts: the pieces, the first and second detachments of waggons.

The commander of the battery takes the pieces into action, the sergeant-major the first, and the quartermaster-sergeant the second detachment of waggons.

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* The Prussian mile is equal to 4·67 English miles.

The first detachment of waggons is composed—

in 6-pounder horse artillery and foot batteries of 1 shell waggon and 2 shot waggons.
in 12-pounder batteries of 3 shot waggons.
in 7-pounder howitzer batteries of 3 shell waggons, together with a few spare men and horses.

The second detachment is composed of—

the rest of the ammunition waggons, 2 store carts, 1 field forge, 1 baggage waggon, and the remaining spare men and horses.

If it bè necessary that the foot batteries should move at an increased pace on the field of battle, the men will ride as follows:

Upon every off horse of the teams 1 man, and on each gun (or howitzer) limber 3 men, consequently with light batteries 6, and with 12-pounders 7 men per piece.*

The remainder of the men attached to the pieces follow the battery in close order by divisions.

Mounting for action is practised at distances varying from 200 to 2000 paces.

Under 200 paces, the object is more quickly obtained by making the men run; and over 2000, it is best to assume the forced march formation, because it is easier both on the men and horses for long distances.

3.—*Preparation for action.*

When batteries on the march approach the enemy, and an engagement is anticipated, they should halt.

The officer in command of the battery applies to the commander of the troops for the regulation escort, in case it should not have been already told off; he reminds the men in a few words of the necessity of steadiness, order, and attention; gives the word "Stand by," and makes over the command of the whole of the waggons of the battery, the spare men, artificers, and spare horses to the proper commanders, who follow the battery at a distance.

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* This system of making foot artillerymen ride on the off horses for short distances to go quickly into action, has been adopted by the Sardinian foot artillery, and it is found to answer perfectly. In the Prussian service, the off horses of the foot artillery teams have pads, with stirrups attached, for this purpose; but a regular saddle on every horse is a better arrangement, as it is further a desirable one in the case of horses being killed or wounded in action.

The commanders of divisions apply to the commander of the battery to have any horses in their divisions which may be tired, exchanged for spare ones, and inspect the following preparations for action:

Girthing up the saddles and pads, letting down and adjusting the stirrups in consequence of any necessary change in the numbers, fastening the cross-rope rein * on the pole-rider's saddle, unlocking the limber and waggon boxes, putting 20 tubes into the tube pouches, taking out some few rounds, unbuckling the aprons and tompions.

4.—*Advancing for action.*

Marching in proximity of the enemy, the artillery should never be at the head of the column, but either in the centre or in rear of the infantry or cavalry.

Its position in column varies, according to whether it belongs to the advance guard, to a division of the main body of the army, or to the reserve.

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* "The cross-rope-rein consists of the middle ropes (11′ 3″ long), connected with buckles and straps, and the four end reins with straps and buckles. The middle ends are 5′ 3″, and the outer 5′ 9″ long and ¼″ thick." The above is the description of this arrangement, to be found at page 175 of the "Lehrbuch der Artillerie für Preussische Avancirte dieser Waffe," Berlin, 1853. The use of it will be seen hereafter, viz., to drive the centre horses of a team when their driver has been killed or wounded, or posted elsewhere. It is a thing, I believe, not used in the British service, and, under correction be it said, might advantageously be adopted.

The artillery remains in column as long as it is included in the order of march of the other troops. As it approaches the enemy, it forms into close column of divisions or half batteries, according to the nature of ground, and in this formation it closely follows the troops until the deployment for action.

As soon as the battery reaches within 1000 paces of the position which it is to occupy, the waggons are halted by their commander, who forms them into the two detachments.

The battery in its advance takes advantage of cover, when available, and remains in column as long as possible; it must, however, deploy as soon as it reaches within the effective range of the enemy's fire.

It should advance directly towards the enemy's position, so as not to be taken in flank.

The commander of the battery rides out at speed towards the enemy, to select a position for his battery, and where the ground is much cut up, or when about to be opposed to the enemy's artillery, he may take the non-commissioned officers in charge of the pieces with him.

The battery, meanwhile, follows at the pace ordered, or awaits the order to advance into the position for action under cover, under the command of the senior officer.

5.—*Conduct of the battery waggons.*

The first detachment of waggons, which is intended for the immediate supply of the expended limber ammunition, halts until the battery has advanced 300 paces, and then follows all its movements, keeping that distance. When the men in the battery mount and advance at a trot or gallop, the commander of the detachment mounts his men on the waggon boxes, and follows at a trot. If the battery halts and unlimbers, the detachment retires 300 or 400 paces to the rear and to the flank, and takes up a position, chosen with care, where it is protected from the fire of the enemy directed at the battery.

The three waggons of the detachment march with intervals of 20 paces between them. The commander rides so far to the front as will enable him to take the order for a supply of ammunition. The waggons which are ordered up for this purpose go up to the line of the limbers, which are re-filled by the spare men, so as to complete the normal quantum of ammunition.

The exchange of an empty gun (or howitzer) limber for a full waggon limber is only permissible when a gun (or howitzer) limber has been disabled by the enemy's fire; but in this case the teams must be changed, in order that the gun (or howitzer) horses may remain with their pieces.

Should any of the waggons be emptied, they must rejoin the second detachment under charge of their conductors.

In more extended movements of the battery, the detachment of waggons endeavours to preserve the specified relations with the battery, not permitting itself to be forced out of the way by other troops. In retreating, the commander of the waggons communicates to the commander of the battery any obstacles which are to be encountered.

The second detachment of waggons, from whose stores the emptied waggons of the first detachment are replenished, halts on the advance for action until the first detachment has reached a distance of 700 paces, when it follows at a walk. It will be thus 1000 paces from the battery, a distance which may be increased to 1500 at most.

Its commander closely watches the march of the action, directs his movements, and takes up his positions, so that he may always keep the first detachment in sight, that he be not injured by the enemy's fire, and that he does not get in the way of other troops.

Should the battery be under fire, this detachment takes up a position under cover at 700 paces from the first, and dismounts the men, when it is to be occupied for any considerable length of time, the men stand by their horses. Should waggons return empty from the first detachment, their places will be supplied by others from the second.

When 2 waggons from a 6-pounder battery, or 3 from a 7-pounder or 12-pounder battery return empty, they must be sent under charge of a mounted non-commissioned officer to the ammunition column nearest to the field of battle, where they will be replenished, and then brought back.

The repacking of the ammunition from the ammunition column into the battery waggons cannot be avoided, because the ammunition waggons are of the pattern of 1816, while those of the battery are of 1842, and the former cannot follow the movements of the battery over all kinds of ground.

The commander of the second detachment must be accurately apprised of the position of the ammunition column. Should the retreat be commenced, the order of the commander of the battery is to be obtained respecting the point upon which it is to be directed, and the detachments, keeping their relative positions, march on it.

SECTION 10.—POSITIONS AND MOVEMENTS OF ARTILLERY IN AN ENGAGEMENT.

1.—*Positions of artillery in an engagement.*

The taking up of a judicious position for artillery in an action, is one of the most essential conditions of success, and a responsibility which must, very properly, devolve upon the commander of every detachment of artillery.

In taking up such a position the following points must be attended to:

(a) The efficacy of the fire of the battery.
(b) Cover for the pieces from the enemy's fire.
(c) The position of the rest of the troops.

In the choice of positions these conditions need not be united in an equal degree; the commander of the battery must, therefore, at once decide which are the most important to secure for the attainment of the main object of the engagement, and which to give up as least essential.

(a) That the fire of the battery be effective is, in all cases, the most important condition which a good position has to fulfil, and no position can be called a good one which does not so fulfil it. Connected with it are the following:

The ground upon which each piece stands must be firm and level, since a sloping position of the wheels is disadvantageous to the probability of striking the object when the piece is laid by the tangent scale, and produces an oblique fire towards the side that stands lowest.

The front of a battery on open level ground should form a straight line, for convex positions cause the fire to scatter, and concave or angular ones expose the flank to the enemy.

In rough ground, it is true that an accurate right ne must be deviated from, and the pieces be placed ccording to the nature of the ground, in order to take dvantage of the cover which such a position affords; t that deviation should not be to such an extent as to endanger the men at the advanced pieces, nor to expose a single piece and its appurtenances to be taken in flank.

The regulation intervals for action must be adhered to as long as the confined nature of the ground, or the advantage of cover, does not necessitate their abandonment, in which case they may be reduced to 10 paces or extended to 40.

The effect of fire may be considerably increased, if the artillery chooses its positions in the most favourable direction with reference to the object, because it may either spread its fire over the whole extent of the object or concentrate it upon one single point.

In every species of fire, whether of shot or shell, the spread of any given number of rounds in an horizontal direction is less than it is in a perpendicular one; it will be advantageous, therefore, under all circumstances, and will increase the effect of the fire, if lines are taken obliquely, and columns in the direction of their greatest depth.

The concentration of artillery fire upon a single point of the enemy's position, is of no less importance.

This may be accomplished by an oblique direction of each piece of a detachment of artillery, standing upon a base parallel to the enemy's position, or by placing two or more lines of pieces in oblique echellon.

For a single battery the first method usually answers the purpose, and is preferable to the second, because in the latter the flank is frequently exposed to the enemy. On the other hand, when a number of batteries are drawn together in mass, for the purpose of embracing the wing of an enemy, the second method should be adopted.

By taking up such an oblique position a very effective fire is certainly maintained; it would be wrong to attribute to it, on the one hand, too great value, and, therefore, to endeavour to gain such a position, while, on the other, it might be attended with disadvantages.

As the object is approached, the nature of the ground has a greater influence on the effect of the fire of artillery, whether of shot or shell.

Upon flat firm ground, which is the most favourable to every species of shot and shell fire, the enemy's pieces will enjoy equal advantages, and superiority is only to be attained by a greater number of pieces or a heavier calibre; but, since such ground is rarely to be found, it is important in all cases so to take advantage of the nature of that ground, that the fire of our guns should be more effective than those of the enemy, or when the effect is equal, that our exposure should be less.

With reference to this subject the following conditions are to be observed:

In hilly or undulating ground, the commanding heights are generally more adapted for positions of artillery than those points which lie lower, because they have a better view of the ground before them, the enemy cannot approach them unseen and unexposed to fire, and the effect of the fire from a height downwards is more favourable than if the case were reversed. The most lofty eminence is by no means unconditionally the most advantageous, but that which falls in a constantly gentle slope towards the enemy, and which has no steep cuts where the enemy cannot be reached.

If it is impossible to give a grazing fire over the slope, some point lying lower must be selected as the position; or the foot of the height may be defended by some pieces specially placed on the flank for that purpose.

The elevation of the ground thus occupied should not be so considerable as to injure the effect of the fire, and we may assume, in reference to this subject, that a slope which does not exceed 4° is not disadvantageous to the fire of artillery.

Frederick the Great, as early as the 10th of May, 1782, in his "Instruction for the Artillery at Potsdam," censured that Arm for committing the gross error of placing its pieces upon the highest points which were to be found upon the field of battle, in order to get a greater range.

The King called this a pernicious prejudice, since it was not the length of the range, but its closeness to the ground which produced the greatest effect; whence, too, it arose, that the shot in loose ground stuck fast, and in firm ricochetted over the lines of the enemy's troops.

Covered ground is but little adapted for the use of artillery, because it confines the view; the estimation of the distances is more difficult, and the effect of the shots enfeebled.

Soft ground, and ground much cut up in front, has the disadvantage of hampering the free movement of the battery; the effect of our own shot which strike it is enfeebled, whereby, when it is over 200 paces in width, much of the effect of canister shot is lost.

(b) Cover for the pieces against an enemy's fire is the second condition of a good position for artillery, albeit one of a subordinate character, for it is only to be taken into consideration when it does not militate against the effect of our own fire.

The losses in action frequently may be considerably lessened by taking up a judicious position against the enemy's batteries, with reference to the ground in front; by a considerate advance to ground occupied by the enemy's sharpshooters; and by making use of natural and artificial cover.

Artillery fire is least effective when the batteries stand exactly opposite those of the enemy, and on a base parallel to theirs, so that those of his shots that miss pass through the intervals of the battery.

Positions of guns, which are oblique to the enemy, or which can be taken in flank, are faulty: should circumstances in action render the taking up of such a position compulsory for a short period, increasing the intervals is a method of lessening the losses much to be recommended.

Artillery should not take up a position under the effective fire of the enemy's sharpshooters, unless the main object of the fight imperatively demands it. It should, generally speaking, keep at a distance from woods or the skirts of villages, hedges, or ditches, which the enemy has occupied with infantry, in order to be out of the effective range of their fire arms. This distance should be, when opposed to smooth bores, between 300 and 400 paces, and against rifles, between 500 and 600.

The natural cover, which ground almost everywhere affords, and which a practised glance alone can discover and turn to account, is either calculated to catch or turn off the enemy's projectiles, such as swamps, meadows, ditches, heights, slight unevennesses and ruts, low dikes, ledges of earth, hollow ways, &c.; or of a nature to hide the pieces from the enemy's sight, and make it difficult for him to lay his pieces and to estimate the distance, such as hedges, thickets, fields of corn, deep heather, &c.

Heights which slope gently towards the enemy afford the best cover, by withdrawing the pieces behind the ridge so far back that the levelled gun is alone seen above it.

Howitzers, which throw at a high angle, may be more completely covered by heights, hollows, buildings, &c., than guns, because their shells are thrown over the objects which afford the cover; only the direction and observation of the shells becomes a matter of difficulty; likewise the change to canister and low angle fire* is impossible, on which account such cover is only to be taken advantage of when the position is secure from a sudden attack, and where the high angle fire suffices.

All cover under fire is disadvantageous, from which the enemy's projectiles knock off splinters and fragments, such as walls, storehouses, woodstacks, &c.

Artillery makes use of artificial for want of natural cover, in previously prepared defensive positions, when the requisite time is available.

This is effected by sinking the piece; for this purpose an excavation is made for it to stand in, the front edge being 1½ feet deep, from whence it runs backwards in an inclined plane, the earth on the front side being thrown up to 1½ feet high, with a gradual slope towards the enemy. Ditches are dug at the side for the men.

This system of sinking the piece is used to particular advantage behind the edge of a hill, because the piece may be brought nearer the ridge, and the slope in front of the artillery is better commanded.

Next to the covering of the pieces from the fire of the enemy's artillery and musketry, covering the limbers is of the greatest importance, for on their preservation the efficiency of the battery, both as to movement and fire, is dependent.

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* *Low angle and high angle fire* are terms used in the Prussian artillery, specifying whether the short howitzer in use in that service is employed as howitzers usually are, or as a mortar.

In a moving fight, when supporting the attack or retreat of the other troops, and when the positions must be frequently changed, little consideration can be given to them, each limber remaining at the regulation distance of 8 paces, straight in rear of its piece: when, however, positions which have been previously prepared, and which are to be maintained for a longer period, are to be occupied, it is then proper, as much as possible, to secure the limbers and riding horses, by taking advantage of whatever natural cover the ground affords; in which case it must be understood that there remains to be considered the easy supply of the battery with ammunition, and the due readiness of the limbers for limbering up.

(c) The third and concluding condition is the consideration of the positions of the rest of the troops, upon which the judicious combination of all Arms in action, and the safety of the artillery, is dependent.

In the different phases of an action one Arm is wont to be of predominant importance, and it is by this one that the other Arms must direct themselves with reference to their positions.

In general, the advance and positions of the infantry and cavalry determine the position for action of the artillery, especially as long as the fire of the last holds the character of being preparative and of acting in support; there are, however, circumstances in which this is not the case, and this invariably occurs when the effect of the artillery is of the last importance, as in defile actions, or where the decision of a battle is to be brought about by large masses of that Arm.

In the first case, where the other troops determine the general course of the engagement, they should not be incommoded in their movements and positions by the artillery, which is attached to them for their support; the latter has, on the contrary, more particularly to dispose itself so that it may not be in the way of the use of their arms, nor of their attack or retreat; further, to protect them, and only to permit the enemy to attack under its canister fire.

For these reasons it usually places itself on the flank of the other troops, or between their intervals, where it is secure itself, and can fire for the longest period of time.

It is aligned on the battalions or squadrons of the first line, and advances up to the supports of the light infantry, but never to the tirailleur or mounted skirmisher line itself.

The position in advance of the front of the other troops has the disadvantage of exposing a double object to the enemy's projectiles; it entails, too, in the attack the necessity of the other troops breaking through the intervals of the pieces, thereby masking their fire sooner than they otherwise would.

The position in front of the rest of the troops is especially hazardous for horse artillery, when allied to cavalry, because the latter is compelled to pass through the artillery both in advance and retreat, and the artillery in an unsuccessful attack, may happen to be ridden over by friend and foe.*

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* A melancholy instance of this occurred at the battle of Chillianwala, in 1849, in the campaign in the Punjab, where H. M.'s 14th Dragoons, returning in confusion from an unsuccessful attempt to charge, rushed through the intervals of Major Christie's troop of horse artillery, upsetting the teams and gunners, followed pell-mell by the Sikhs. The gallant and excellent commander of the horse artillery was sabred at his own guns. His dying words were to the effect, that if the 14th Dragoons had only retreated by his flank and left him free to fire, he would have kept the Sikhs off. The British lost several guns.

In the other case, when the effect of artillery is of primary importance, and when the decision of a battle is to be brought about more particularly by that Arm, the position in front of the infantry, in consequence of the limited space, cannot always be avoided; it must then be considered as an inevitable evil.

The distance of artillery from the flank of the other troops should never be too great, in order that the mutual support in the attack on the enemy may not be compromised by the position of the former. At the commencement of an engagement, when still at a distance from the enemy, the artillery has more latitude in the choice of its positions than during the progress of the action; upon the approach of the crisis, however, it must always keep a closer connection with the other Arms, so as not to expose itself to a sudden flank attack.

Positions of artillery in the rear of troops in column are in particularly exceptional cases admissible, such as can only happen in defile engagements, where a very confined terrace-shaped ground must be made use of.

In such cases it should only fire round shot and common shells, and never shrapnell shells or canister shot.

Indeed, Frederick the Great decided that artillery should never fire over infantry, but should bring its pieces to their front; for, if even the advancing troops suffered no injury from it, still it makes the advance more difficult.

2. *Movements of artillery in an engagement.*

Movements during an action interrupt the efficacy of the fire of artillery; they must therefore be executed [illegible] the adequate velocity, according to the scene of action and the nature of the ground. It is impossible to lay down suitable rules for every case, it must therefore all the more be left to the commander of every independent detachment of artillery to adapt the pace, of the advance to the front to come into action, as well as of the retreat from it, to the existing circumstances. The movements are performed,—

With pieces limbered up: in all evolutions,—all quick or sustained movements,—and in all cases where the ground is uneven or cut up.

With the prolonge: in slow advance or retreat—for short distances,—over even ground, in combination with infantry, in order powerfully to support their retreat by a constant readiness to open fire,—and in the presence of a pursuing enemy.

The horse artillery do not make use of the prolonge in a cavalry action, but only when they occupy the place of foot artillery with infantry.

With the men mounted: in order to increase the mobility of foot artillery to the utmost on the field of battle, both in advancing and coming into a position for action, as well as in retreating when foot artillery in its moment of need is endangered in its position after a long struggle,—or when it has to take up a position quickly to the rear: moreover, in such cases the spare men must be sent forward or join the nearest infantry.

SECTION 11.—NATURES OF FIRE OF FIELD ARTILLERY, AND THEIR EMPLOYMENT IN AN ENGAGEMENT.

The range of our field pieces extends up to 3000 paces and more, nevertheless fire should not be opened at such great distances in the open field, the limit should not usually much exceed that of good unassisted vision. A good eye can only distinguish the larger bodies of troops with certainty up to 2000 paces, and this distance is to be likewise taken as the farthest limit of an effective fire.

The use of artillery fire at distances beyond 2000 paces will sometimes occur in the open field, but it must then be considered as an exceptional case, and the limit is there fixed as an artilleristical principle.

1. *Natures of fire of field guns.*

They are divided according to the nature of the projectiles, into round and canister shot, and shrapnell shell fire.

The round shot fire is, according to the trajectory of the projectile, either ricochet or first graze fire.

a. *Ricochet fire of field guns.*

The shot in ricochet fire should make several bounds upon the ground before striking the object. The number of the bounds is dependent upon the nature of the ground and the distance of the object, from 4 to 12 may be assumed.

As each impact diminishes the force of the shot, consequently the bounds towards the end of the trajectory are shorter and lower, until at last they do not rise above the height of a man.

Laying the axis of the piece horizontally the 6-pounder shot, after having made about 4 bounds, assumes this low path at about 1300 paces;* that of the 12-pounder at about 1500 paces.†

At shorter distances ricochet fire from field guns is not used, for the bounds are too high and the space usefully commanded is too small.

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* About 1080 yards.

† About 1250 yards.

The limits, then, of this fire lie with the 6-pounder between 1300 and 2000 paces, and with the 12-pounder between 1500 and 2000 paces.

If the extreme range of ricochet fire, with the 6-pounder be assumed at 2300 paces, and with the 12-pounder at 2500 paces, the extent of ground usefully commanded will be, with both calibres, 1000 paces.

The nature of the ground has self evidently the greatest influence upon the effect of this fire.

Uneven or rugged ground may render it totally useless or irregular in flight. The most favourable condition for its employment is an open, flat, and firm piece of ground, or a calm sheet of water. It is used only on favourable ground, at distances which lie beyond the limits of first graze fire, against large and deep columns or against several lines of troops standing one behind the other.

As to the value of this nature of fire, it should not be esteemed too highly, as it was wont to be formerly by all the artilleries of Europe.

It must be considered as progress in artillery, when it does not trust to chance for the effect of its fire, as with ricochet is the case, but endeavours to strike the object directly. Upon these grounds, this nature of fire is at present much less used than formerly, and now chiefly on the defensive for the purpose of opening fire on the advancing columns of the enemy, when the ground has been found upon personal inspection to be firm and even.

On the offensive, when not in possession of any accurate knowledge of the ground, and when the judgment of the fitness of that ground for this nature of fire is so likely to be deceived, it is not to be recommended, because it attracts the attention of the enemy too soon without doing much execution.

The horse artillery especially should make use of it only in an exceptional case, because it is less their part than that of any other artillery to remain beyond effective range.

b. *The first graze fire of field guns.**

The first graze fire should strike the object at the shot's first impact. According to the elevation which the gun has we have line of metal and tangent scale fire.

The line of metal fire with the 6-pounder strikes the ground at 200 paces, and with the 12-pounder at 300; beyond these distances the tangent scale fire commences, this extends with the 6-pounder to 1600, and with 12-pounder to 2000 paces.

The more the tangent scale is raised, as the distance increases, the less ground is usefully commanded, and the less the number of hits.

The first graze fire is independent of the nature of the ground, but as about one half of the hits in the butt at practice are made after ricochetting, it is desirable that there be no soft or uneven places immediately in front of the object. Ground which rises more abruptly than an angle of 4°, causes great ricochet angles and consequently fewer hits.

The percussive power of first graze fire exceeds that of ricochet fire.

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* We have no term in our word to express the nature of this fire, and I have been compelled to adopt the above, as certainly conveying the idea, though in a clumsy manner. Were I translating for school boys I should find no difficulty, as *plump* fire would at once convey it to them, borrow ing from the vocabulary of the game of marbles.

The first graze fire is used with good effect between the limits of ricochet fire and those of canister shot fire,

with the 6-pounder from 1300 to 600,

and with the 12-pounder from 1500 to 800 paces, in an engagement with the enemy's artillery and to rake infantry and cavalry columns, as well as closed lines of troops.

Beyond these limits it is to be preferred to the ricochet fire, for the 6-pounder up to 1600, and from the 12-pounder up to 2000 paces against large masses of troops, when the ground is unknown and when that species of fire is decidedly unfavourable.

Short of the prescribed limits of 600 and 800 paces respectively it is to be preferred to canister fire, when enemy's troops, the object fired at, are formed into deep and narrow columns, or when the ground is totally unsuited to canister shot fire; and further, when the great percussive force of first graze fire is required to destroy walls, buildings, gates, or other substantial objects.

The value of first graze fire is much greater than that of ricochet fire, and its effect from 1200 paces and upwards against troops of all sorts is very considerable. In consequence of the simplicity in its employment, and its independence of the ground, it is of all natures of fire the most frequently employed in the open field.

The first graze fire of the 12-pounder exceeds that of the 6-pounder generally by 200 paces; this superiority is more marked at long distances than at short.

c. Canister* shot fire of field guns.

The canister is broken by the shock of the exploded charge in the piece, and the balls spread themselves out in front of the muzzle in the shape of a cone.

They strike the object partly directly, partly by ricochet.

As the number of balls which issue from the piece is very considerable, and as, in consequence of their diminutive size, they easily stick or lose their force, when the ground is soft or uneven, it is obvious that the effect of this nature of fire is more dependent upon the nature of the ground than any other. It is only firm even ground which gives good effect, while, on the other hand, meadows, freshly ploughed fields, ditches, ledges of earth, tall tubers, and even fields of corn considerably diminish the effect of this fire.

The large balls of the 12-pounder overcome the obstacles of the ground easier than do those of the 6-pounder; the heavier calibre is superior to the lighter by an average of about 200 paces.

In favourable ground, canister shot fire is used against lines or columns of troops,

up to 600 paces with the 6-pounder,
and up to 800 paces with the 12-pounder.

Here it must be remarked, that the columns against which it is fired should have at least a front of 20 paces, because against those of a smaller front the round shot is more advantageous; on the other hand, the flanks of such columns in passing defiles cannot be more effectually plied than by canister shot fired from pieces in position on a flank.

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* The 6-pounder canister in the Prussian service contains, 41—3 oz. balls; the 12-pounder, 41—6 oz. balls; and the 7-pounder, 56—3 oz. balls. The weight of the canister full is 1½ times that of the corresponding round shot. This ammunition is much heavier, both as to the weight of the projectile and of the individual balls, than that in the British [illegible]

Canister shot may be used against the enemy's artillery in the last stages of an attack, in order to put their men and horses *hors de combat;* it is particularly effective when it can be thrown in on the flank of an enemy's battery. Against field entrenchments, villages, and skirts of woods a lively canister shot fire should precede the storming columns of the infantry. To prevent a thick swarm of tirailleurs from penetrating into the battery it is often the last resort, when our own musketry fire is incapable of doing so.

Canister shot fire is more equally and surely effective than shrapnell fire; especially in quick firing and when the object is in motion. It is always to be preferred to shrapnell fire in the defence of a battery, when the attacks of the enemy's troops are to be beaten off. Under 600 paces it is annihilating, and decides the fray in a few minutes; at greater distances, on the other hand, it may in unfavourable ground be ineffective; it is, therefore, to the interest of the artillery not to deprive themselves of this last decisive measure, by making use of that nature of fire too early; for an unprofitable canister shot fire causes the enemy to undervalue it, and weakens the confidence of our own troops in their artillery.

d. *Shrapnell fire of field guns.*

The peculiar characteristic of this projectile is, that it should burst during its flight in front of the object. When this occurs, the bullets which are thus freed from the case, continue the flight in the same direction and with the same velocity which the projectile had at moment of explosion; they spread themselves out in the form of a cone, and strike the object in an oblique direction, inclining from above downwards. The bursting charge has for its object the rupture of the case only, and not the increase of the velocity of the bullets.

Shrapnell fire belongs to that class which is most independent of the nature of the ground, as the continuance in motion of those bullets which have struck the earth a little too soon, even on firm and even ground, can be but little reckoned upon. The shrapnell may be considered as canister carried by its envelope over the obstacles of the ground to a great distance, and we must concede to it a great superiority over the last-named species of projectile, in consequence of such independence of the nature of the ground.

The knowledge of the distance of the object is of more importance than the nature of the ground, in order to be able to adapt the fuze and elevation correctly. If the distance is estimated 100 paces short, one-third, if 200, two-thirds of the hits are lost, which would have been made if the proper length of fuze and elevation had been employed. It is still more disadvantageous to estimate the distance too far, for then the explosion of the projectile ensues after it has passed the object, and the effect is nullified.

From these considerations we deduce the following rule: never to estimate the distance at too high a figure, but rather somewhat under the mark, and carefully to observe the point of explosion of the projectile, in order to acquire a datum for the determination of the correct distance by the exact time of burning of the fuze.

The point of explosion determines two important quantities for the correction of the fire, *the interval and the height of the explosion.*

The interval is the horizontal distance of the point of explosion from the object; it should be great, that the bullets may have time to spread out in the proper ratio to the breadth of the object: the interval is determined by the choice of the proper length of the fuze. To determine this is the main point in the correction, and must take precedence of every other. When the correct length of fuze is found, the proper elevation is taken from the practice table for the distance in question.

The height of the explosion is the perpendicular distance of the point of explosion above the ground; it should be so high that the projectile would strike the object as a round shot, if it did not explode. It is regulated by the tangent scale; no attempt, however, should be made to improve upon it until the correct interval is first ascertained. If, after the correct fuze and its corresponding elevation is found, the height of the explosion be too great or too little, it can be altered; when the height is too great the elevation is decreased, when too little it is increased.

The altering of the fuze and elevation should not take place before three successive rounds; for a single shrapnell may have the greatest effect, while sometimes others fired under the same circumstances may have but a trifling one.

Shrapnell fire is employed with the 6-pounder from 500 up to 1000 paces inclusively; and with the 12-pounder from 700 up to 1200 paces inclusively. It consequently commences somewhat short of the limits of canister shot fire and ends far beyond it, when the round shot fire again acquires the superiority.

The spreading of the leaden bullets lengthwise is greater than that breadthwise, they are, therefore, more effective against high and deep objects than against broad and flat ones.

For this reason, lines of infantry suffer less from them than columns. Lines of cavalry more than both, on account of the height of the object which they present; but cavalry columns suffer most.

Shrapnell fire is chiefly employed in a standing fight, when the enemy's troops, against which it is directed, do not alter the positions they have taken up.

Should the enemy, however, move, it is not proper to fire shrapnell at him, because a continual change of fuze and elevation would be requisite, which is not to be carried out, with proper accuracy at least, against cavalry moving with great velocity.

The fire must be given calmly and by no means be hurried; the serving of the pieces, the observation of the shots, and their effect, must be carried on with attention.

It is, therefore, necessary that the batteries that are to make use of it should be, as much as possible, secured from a sudden attack, either by the distance of the enemy, by troops posted near them, or by difficulties of ground.

In close fight, when time presses, and the calm serving of the pieces and observation of the effect cannot be carried out, the canister shot is to be preferred.

Batteries, which when firing shrapnell are attacked with the steel, must for that reason cease to do so and change to canister shot fire.

In an action at night when the observation of the intervals and height of explosion is impossible, shrapnell should not be used.

Shrapnell fire is employed with great success against close lines of infantry and cavalry standing upon open ground, and with still greater effect against columns of troops of great depth and corresponding front; likewise against artillery in position, especially when it can be *taken obliquely.*

Should the troops, on the other hand, be so covered by heights or hollows of ground, buildings, &c., so that they cannot be seen from the piece, this fire is not to be employed, because the requisite observation of the intervals, of the heights of explosion, and of the effect produced cannot be made.

When it is stated that shrapnell fire should not be employed against troops under cover, one exception must be made, viz., when that cover consists of field works; for the point of explosion can be observed sufficiently accurately over the crest of the work. Further, in such a case it is a powerful means of attack, in order to enfilade the lines of the works and to dislodge the defenders from the breastwork, as well as to ply the reserves standing in the interior of it.

Against defiles which can be overlooked and enfiladed, or whose openings are commanded at an effective range, shrapnell fire will be of great use; for such engagements usually partake of the character of standing fights, large masses of troops are accumulated at the point of passage, and the distances are accurately known to the defenders.

Well applied shrapnell fire is more effective against troops than any other fire of artillery; but it is subject to many contingencies from its artificial nature, which are not in our power completely to control.

In comparison to canister shot fire, to which it bears the greatest similarity, it can equal it, and, under certain circumstances, surpass it; because from its range, which lies beyond the reach of canister shot, it produces very considerable effect; but we should fall into an error were we to consider canister shot fire superfluous. It continues to be, on the contrary, both on the offensive and defensive, the most trustworthy and readiest projectile when the distance is close, the moment short and sudden, and where there exists a firm will to produce a decisive effect.

The premature explosion of shrapnell in the bore or a short way in front of the muzzle is another evil, though one of rare occurrence. Such a projectile still acts as a canister shot, and is not dangerous to the men serving the piece, only that the possibility of its occurrence compels the artillery never to use it in a retired position from which it must fire over the heads of the troops or through their intervals.

Shrapnell ammunition should be saved as much as possible, for it is both costly and difficult to replace; it should, therefore, never be employed unless there are hopes of its creating considerable effect, and when that object cannot be attained by other projectiles.

2. *Natures of fire of field howitzers.*

They are divided according to the nature of the projectile, into common shell fire, canister shot fire, and shrapnell fire.

Common shell fire is, according to the nature of the trajectory, low angle fire, high angle fire, or ricochet fire.

a. *The low angle fire of the 7-pounder field howitzer*

is intended to strike an upright, uncovered object, and bears the greatest similarity to the first graze fire of guns, from which it only differs in the nature of the projectile. It should, like the latter, strike the object without having previously touched the ground, and destroy by its percussive force; the bursting of the shell, when it has lodged in the object, can be reckoned upon but in few cases.

In order to produce great percussive force and a trajectory as little curved as possible, its charge is invariably the heavy service charge, and the elevation as small as possible.

It is used in the open field at distances varying from 500 to 700 paces, on the same grounds as the first graze fire of guns against the enemy's lines and columns of troops, wooden houses, gates, and barricades.

By means of a particular operation* in loading, it may be used up to 2200 paces.

Its advantages are: great percussive force, effective command over a large space, perfect independence of the nature of the ground, and lively fire; on the other hand, it has this disadvantage, that the explosion usually does not take place till after it has passed the object—a matter which is left to chance, because the fuzes of the shells are not timed, but are cut according to the longest time of flight.

Cutting the fuzes to time would have the disadvantage of rendering the service of the pieces more difficult under fire, as well as of retarding it, and would consequently introduce the complication of shrapnell fire into common shell fire.

These disadvantages preponderate with short howitzers, and they stand so out of all proportion in comparison with the advantages which might be expected from this fire, that we may enter into this subject all the less, particularly as the short howitzers are enabled, by means of ricochet and high angle fire, to realise the explosive effect of their shells.*

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* This alludes to the new shells, which are cast purposely excentric, *i. e.* the hollow internal sphere not having the same centre as the external figure. When the shell is placed with the centre of gravity *under* the axis of the piece, the range is, it will be observed, from 500 to 1700; when *above* the axis, from 700 to 2200 paces. Should such an advantage be neglected in Her Majesty's service? In order to discover the exact point of a shell which when placed lowermost in the pieces will raise the centre of gravity highest above the axis of the bore, and which is called by the Prussians "the light-pole," the shells are floated in mercury. A disc of card suspended by a silk thread, and covered on its lower surface with white oil-paint, is held by the hand over the shell and gradually lowered on to it, leaving a white dot. The card is evidently a tangential plane to the sphere, at the end of a diameter of a great circle, which passes through the centres of figure and gravity.

With long howitzers the question appears, on the other hand, different, because they cannot make use of the high angle fire at small and medium distances. Most artilleries which make use of long howitzers, nevertheless, do not cut their fuzes to time for the sake of the men serving the guns; the English artillery forms the only exception.

b. *The high angle fire of the 7-pounder field howitzer.*†

This nature of fire is peculiar to the short howitzer, and gives this piece pre-eminently the character of the bombard of a field campaign. The high angle fire is intended to strike a horizontal and covered object, and is distinguished from the low angle fire by an extremely curved trajectory. The shell is intended to remain where it first strikes, and there explode. The explosive effect is chiefly depended upon.

The charges increase with the distance; the elevation is such that the projectile should not proceed further than the spot it first strikes.

It is used at distances from 500 to 2000 paces, and

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* It should be recollected that the short Prussian howitzer of between six and seven calibres in length is nothing more than a field mortar on wheels.

† The 7-pr. field howitzer has three sorts of cartridges, viz.:

The heavy field service charge of .	1¼ lb.	Prussian.
The small „ „ .	3-8ths „	„
The auxiliary charge of . .	1-8th „	„

So that putting the last two together, the charge may be varied between 1-8th and 1¼ lb. The Prussian pound is to the English pound nearly as 1·3 : 1.

they may be extended by a particular method of loading up to 3000 paces.*

The nature of the ground is only of importance at the spot where the shell strikes. It should be firm, in order that the shell may not be too deeply imbedded. If it is soft enough to permit the shell to sink into a depth equal to its own diameter, the effect of the explosion will be considerably diminished. Swampy, soft ground consequently limits the adaptation of this fire.

The particular intention of this fire is to render available the fire of artillery, where heights and hollows, entrenchments, villages, thickets or other cover from direct fire would make the fire of ordnance otherwise inapplicable. It is, therefore, used against closed field works, against covered positions of the enemy's reserve, against covered positions of artillery, against towns, villages, and farms, to set them on fire, and against troops in winding defiles. It may be used, likewise, with advantage on the open plain against strong columns of infantry and cavalry, when the explosive effect is of especial importance, when soft ground forbids ricochet, or too long a range shrapnell fire.

The explosion of the shell gives this nature of fire a marked superiority over low angle fire; it only admits of a slow fire, requires the pieces to be served with calmness and an attentive observation of the hits and explosions.

It must consequently only be used from safe positions, in which the battery can remain for a considerable length of time stationary.

c. *Ricochet fire of the 7-pounder field howitzer*

is distinguished from the ricochet fire of guns by the projectile, as well as by the fact that the charges are not constant, but increase with the distance, by which means it is possible to bring it into play at a shorter distance than the ricochet of guns. The elevation in ricochet fire is small and has little influence upon the range.

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* *Vide* note at page 69.

It is used at distances varying between 700 and 1700 paces, and by employing a special method of loading* it may be made to reach greater distances, up to 2500 paces.

The shell, which reaches the object after having bounded several times, and which on its close approach ricochets gradually lower, either penetrates it or remains lying on it when the explosion takes place. It has a more advantageous explosive effect than in high angle fire, because the shell bursts on the surface of the ground. Its percussive force is certainly but small, sufficiently great, however, against troops, or wooden objects of slight scantling.

Howitzer ricochet fire is, like gun ricochet fire, dependent upon the nature of the ground, and is not applicable to soft, uneven, or rough ground.

It is superior to low angle fire in the explosive effect, and to the high angle fire in more effective explosion, and in its ricochets being lower. On account of these advantages, it is preferred to both those kinds of fire against lines or columns of troops, whenever the ground is firm and even and the enemy uncovered. It is particularly adapted, on good ground, for enfilading long lines or columns of troops.

d. *Canister shot fire of the 7-pounder field howitzer* does not differ from that of guns, it is to be assumed as equivalent in effect to that of the 6-pounder, and is employed under similar circumstances at distances up to 600 paces.

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* *Vide* foot-note, page 69.

e. *Shrapnell fire of the 7-pounder field howitzer* does not differ from that of field guns. It is employed at distances of from 400 to 1200 paces inclusive.

SECTION 12.—MODE OF CARRYING ON THE FIRE IN A BATTERY.

1. *Choice of the object.*

The choice of the object to be fired at must be determined by the particular purpose the artillery endeavours to effect, and should be changed with that purpose during the course of the action. In the beginning of an engagement, and when the pieces cannot yet contribute to their own defence, they direct their fire where the distance, ground, and position of the enemy hold out the greatest promise of effect. When the battle has advanced, and in decisive moments the objects to be fired at suggest themselves, and the pieces should then fire against those Arms of the enemy whose resistance is most obstructive or advance most formidable.

On the offensive, the fire is chiefly directed against the enemy's artillery,* in order to divert their fire from the other troops, and to facilitate the advance of the latter; on the defensive, on the other hand, it is especially directed against the enemy's infantry or cavalry, to prevent their advance.

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* In Captain Lefroy's "Handbook for Field Service," published in 1854, at page 86 we find the following maxim: "Guns should be pointed on troops, and not on the enemy's batteries. If the enemy's batteries are troublesome, they should be taken in flank by horse artillery:" it may be likewise found in other works connected with the Royal Artillery. It is, I conceive, erroneous as a general principle, and often impracticable. During the cannonade, which usually commences an engagement, there is rarely anything visible within range to fire at but the enemy's guns. Besides, it requires more *sang froid* and devotion than usually falls to the lot of man to abstain from endeavouring to check the fire of an enemy's battery which is inflicting loss on you, though it is obviously the proper course to fire upon the enemy's troops (if they are to be seen) when a battery is covering an advance or resisting an attack. The proper version of the maxim is, I consider, that which our author comprehensively gives us in the text.

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In the last case, should the artillery be plied by that of the enemy, it should not on that account be induced to divert itself from its object.

A number of objects should not be chosen, for this leads to a reprehensible scattering of the fire, and produces no decided result; while the concentration of artillery fire upon a small space seldom fails of effecting the object in view, because relative loss is more decisive than absolute.

In an engagement between artillery on either side, it is the most advantageous plan for several pieces to concentrate their fire upon one of the enemy's until it is dismounted, and not to change to another until that object has been effected.

Against infantry and cavalry columns, the whole of the pieces should fire upon the centre of the body; against deployed lines canister shot and shrapnell fire should be directed upon the whole flank.

Artillery only fires exceptionally against little knots of men, tirailleurs, and lines of flankers.

2. *Determining the distances in the field by estimation.*

The efforts at constructing a serviceable instrument for measuring distances for field artillery have hitherto met with little success. Endeavours are still being made to contrive an instrument, which, from a single station, should indicate distances up to 2000 paces with adequate accuracy, without any calculation, and such as may [illegible] used on horseback. The instruments and telescopes hitherto invented, which can be used from a single station, are based upon this principle,—that the height of an infantry or cavalry soldier is taken as the base of a right angled triangle, whose perpendicular side is the distance sought, and the angle under which it is seen is measured by the instrument. We may easily see that the determination of the distance upon such a principle is subject to the following objection, that there exists no just proportion between the base and the perpendicular of the triangle, and, consequently, that the angle under which it is seen is very small. Distance measurers constructed upon this principle determine distances beyond 600 paces with but little accuracy.

Another class of instruments for the purpose, which require two stations for the determination of the distances, besides certain operations in the field, gives a sufficiently accurate result, but a very general opinion obtains that they are too complicated for use on service.

So long as the existing want of such an instrument is not supplied, it only remains for artillerymen to judge the distances in the field, without the assistance of any instrument, by means of tokens (which may be recognised at certain distances) on the object itself whose distance is required to be known. It is only abundant practice which can ascertain such tokens with any accuracy, they are different for almost every eye, on which account general data are of little value. Further, it is well to take into consideration the strength of the light and the appearance of the ground. With sufficient practice, the error in 1000 paces will not exceed 100 paces, and satisfactory accuracy may be obtained up to 1500 paces.

In practice it is the wisest plan to make out these tokens on single men, horsemen, and troops, in close order.

Good eyesight recognises masses of troops at 2000 paces; it distinguishes infantry from cavalry and the movement of troops at 1500 paces; it can make out a single man as a long figure at 1200; it sees the movements of arms and legs when in motion at 1000 paces, the head as a round ball at 800 paces, the face in the ranks as a light coloured spot at 600 paces.

If the artillery is to open fire at distances which have only been guessed, an attentive observation of the first grazes of the shot and the shrapnell fire will facilitate its correction.

The greatest error which can be committed in judging the enemy's distance is to overrate it, for in this case the tangent is too high, and the mark is overshot. It is much better to undervalue it, because when the shot strikes short it can be easily seen and altered.

3. *Opening fire.*

Fire should not be opened until the enemy is within effective range, that is, within such a range that at least one quarter of the shots are hits.

In good ground, firing at an object of the breadth of a battalion in double column of subdivisions,* effective fire extends

with the ricochet of the 12 and 6-pounder guns, and the 7-pounder howitzer, up to	2000	paces.
with the first graze fire of the 12-pounder and the low and high angle fire of the 7-pounder howitzer up to	1500	„
with the first graze fire of the 6-pounder up to	1300	„
with the shrapnell fire of the 12-pounder and 7-pounder howitzer up to	1200	„
with the shrapnell fire of the 6-pounder up to .	1000	„
with the canister shot fire of the 12-pounder up to	700	„
with that of the 6-pounder and 7-pounder howitzer up to	600	„

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* This is the column of attack, and its front will be about from 75 to *100 feet wide, according* as the battalion varies in strength between 800 *and 1200 men.*

The limits of the distance at which an effective fire of artillery may be opened lie between 2000 and 600 paces, according as the different natures of fire are employed.

Dividing these distances into long, medium, and short, and conceiving the long distances to be between 1500 and 2000 paces, it may be said of them, that the fire of artillery under these circumstances will do but little execution, and care should therefore be taken that the fire is not too brisk, and that the ammunition be not expended in an unsatisfactory manner.

On the other hand, the medium distances, from 1000 up to 1500, are far more productive of effect, as the hits rise as high as 50 per cent. It is at these distances that a combat with the enemy's artillery takes place, and that the enemy's columns of infantry and cavalry may be plied with great effect.

The short distances, between 500 and 1000 paces, are peculiarly the decisive ones in action, as the fire produces the best effect against troops of all sorts.

On a review of these relations between effect and distance, it appears that the fire of the heavy gun and howitzer batteries should not be opened beyond 1500 paces, and that of the light batteries beyond 1200 paces.

If the artillery observe this rule, it will not lay itself open to the oft-repeated charge of opening fire too soon.

Frederick the Great observes, in his already quoted Instruction, as follows:

"The preparations and the different movements which precede a battle occupy from three to four hours, according to the nature of the ground. It is, however, at all times reprehensible and prejudicial that the artillery should open fire as soon as the enemy can be just seen, and when it thinks that they may be reached.

"Neither the attacking party nor the attacked have anything to fear from such a fire, because it is simply ineffective on both sides. The attacked party expends his powder without advantage, while the attacking party not only loses his powder, but his evolutions are executed much more slowly, and his enemy thereby gains time to throw obstacles in the way of the attack, unhampered."—The king seems constantly to have remarked this fault, of opening fire too soon, in his artillery, and ascribes the impatient conduct of his infantry to that cause.

The fire of the artillery continues until it observes that its shot are half expended; it must then be moderated from fear of running short of ammunition, exactly at the moment when it should be hottest. The king, in his instruction, goes on to say: "It likewise happens, that the general in command, or some other general, himself is forgetful, and orders the fire to be opened too soon, merely to astound his own troops, without considering what injurious consequences may result from it. In such a case the officer must certainly obey, but he should fire as slowly as possible, and lay the pieces with every possible accuracy, in order that all his shots may not be thrown away.

"Such a fire is only pardonable when the general wishes to attract the enemy's attention to one point, so as to make various other movements."

4. *Quickness of fire*

increases the power of execution of the pieces, but it must always be confined within certain limits; for it is not quick, but well-aimed and accurate practice upon which the success of artillery fire depends; on the other hand, too quick fire is without effect, it squanders the ammunition, and is dangerous to the men.

The general rule runs thus: the fire should be slow as long as the enemy is at a distance, and the probability of a hit small; quicker when the enemy comes nearer, when the distances can be judged more accurately, and when its effect increases; and quickest with canister shot at the critical moments, shortly before and after attacks are made with the steel, when our battalions advance to the attack with the bayonet or the squadrons to the charge, when the enemy's troops advance to the attack of ours, when they are delayed by obstacles of ground, or when they expose their flank.

With well drilled men, the following number of rounds may be fired, and accurately laid, in one minute.

1 High angle shot.

2 First graze, low angle, ricochet, or shrapnell, and

3 Canister shot, or common shell.

The three field calibres bear to each other, with reference to their quickness of fire, the following proportions:—6-pounder : 12-pounder : 7-pounder = 5 : 4 : 3.

5. *Order of fire.*

The order of fire is as follows:—

The fire of roundshot, shell, or shrapnell should be given from the pieces at the word of the commander of divisions from the windward flank, running thus through the battery; the fire with canister shot should be at the command of the non-commissioned officers in charge of the pieces, as quickly as possible without any determined order, only that both pieces of one division must be laid one after the other, and never fire together, so as to keep up a continued fire; the commander of the battery may determine another order of canister shot fire.

6. *Observation of the shot and shell.*

The results which are obtained at practice cannot be nearly attained in action, for the following reasons: the ammunition suffers in transport, the distances are unknown, or can be guessed only with uncertainty, the ground is under cultivation, the object often under cover, the moral effect of the enemy's fire, as well as the losses suffered from it are discomposing.

These are inherent difficulties, to do away with the injurious influence of which every possible endeavour should be made, and this can be done in no other way than by a very attentive observation of the shots and their effect. As it is difficult to observe the practice at a long distance, the fire should commence rather too short than too long, and with the lowest admissible height of tangent.

The observation of the shot and shell during the flight, of the first grazes, of the deviation sideways and lengthwise, must be made with the naked eye; for the small field of the telescope does not admit of being used in this operation; on the other hand, the best eye is often unable to distinguish the effect produced, and the possession of a good telescope by every officer is, therefore, highly desirable.

The observation from the piece is often rendered difficult and impracticable from the smoke of the powder, the dust, wind, rain, and undulating ground, the observer is, therefore, compelled to advance towards the object.

The observation is best made by detailing it into different hands. It appears under such an arrangement to be most judicious that the non-commissioned officer should observe the deviation of his shot to the right or left, without leaving his piece; the commander of a division,[*] the same deviation as well as the intervals[†] of the shrapnell, and their heights of explosion, having placed himself for the purpose at a distance equal to the width of a division on one side of his pieces; while the commander of the battery observes the general effect of the fire of the battery, choosing some point to one side or in advance of it, and when possible, on an eminence.

In ricochet fire upon ground known to be favourable, the above detailed method of laying the pieces is employed, without seeking to make any alterations in it; on unknown ground it is altered only when the projectile, after the first graze, makes very irregular bounds in order to change the venue to a more favourable point.

In first graze fire of guns and low angle fire of howitzers, the first grazes of the shot and shell are carefully observed, and the elevation is not altered if one-half of them strike before, and the other half behind the object, for then it may be assumed that the correct elevation has been adopted.

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[*] By reading to the end of this sentence, it will be observed that the officers do not lay the guns. I have it, too, on the authority of a gentleman in the Prussian Artillery. It is supposed by all (I believe) continental nations, that the officers have enough to do without this extra duty, and that that duty is somewhat *infra dignitate.* The latter reason can have no weight, of course; but the former appears to be a valid one, particularly as the laying of a gun can be quite as well performed by the non-commissioned officer in charge, under the direction of his officer. Again, in the British service, where fuzes are cut or bored in action, and wherein shrapnell is most extensively used, it must be totally impossible for one man to attend to the laying of two pieces, to direct the cutting of the fuzes, to see to the removal and replacing of men and horses placed *hors de combat*, and to the observation of his practice. And what is the upshot of the present arrangement in action? Why, that each officer lays one piece, sergeants the rest. Again, if the officer lays the pieces, what is the non-commissioned officer's duty? In the drill book we read, "No. 1 lays and commands;" at half the guns of a battery in action he certainly does neither the one nor the other.

[†] This term has been defined at page 65.

In high angle fire the point of impact of the shell is closely watched, the charge and elevation are altered only when it appears decidedly necessary, because frequent and quick changes are disadvantageous.

Further, the attention is directed to observe whether the shells explode, and if it is perceived that they throw up a great quantity of earth into the air, we may be convinced that they have penetrated too deeply, and that their explosive effect is inconsiderable. It will then be advisable to change to another kind of fire.

In the ricochet fire of howitzers, the shells may be easily followed with the eye, and the effect may be assumed as good, when one-half of them strike through the enemy's line, and the other half remain lying close in front of it and explode.

In canister shot fire alteration can seldom be made, on account of the quickness with which it is given, and the proximity of the enemy.

The commanders of divisions watch the effect of their pieces, and order any urgently necessary alteration in the elevation.

In shrapnell fire, the effect may be assumed to be good, when the interval and height of explosion appear correct. Another and less certain sign is, the striking of the bullets before the object, which may be discerned in dry weather by the dust which they throw up. If many strike before the object the interval is too great, if none strike before it, it is too small. The surest sign of shrapnell fire is the effect which the bursting projectile produces upon the enemy's troops. In good practice it will be very striking and easily recognised, and it is upon this that the commander of the battery should more particularly direct his attention.

The usual symptoms of good effect of the fire of artillery against troops are: opening out, wavering, and frequent change of position; these will be more remarkable according to the amount of the loss, the solidity and peculiar quality of the troops. Against artillery it shows itself by a diminution of the fire, silence, and a withdrawal of single pieces.

In the battle of Lutzen,* a French battalion, formed in mass, composed of old soldiers, stood firmly against a close canister shot fire of a Prussian battery for a couple of minutes, then retired in tolerable order, and beat off a cavalry attack immediately following; while another battalion, composed of conscripts, almost under the same circumstances, was dispersed by about twelve canister shots.

At Leipzig,† a round shot carried off several men from the angle of a Russian battalion formed in mass, without producing a waver in the rest; while another battalion in mass, in which a single shell burst, was completely scattered.

7. *Thrift in ammunition.*

The proper expenditure of the ammunition is one of the most important duties of an artilleryman. An officer who squanders the whole of his ammunition in a short engagement, proves himself incapable of appreciating the due effect and use of his arm, and incurs the heaviest responsibility. To avoid this, it is important to be guided by the standing rules of our artillery with reference to the mode of carrying on the fire, which are comprised in the above, for it is only by a strict observance of them that a proper harmony between aim, effect, and expenditure of ammunition can be attained.

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* 2nd May, 1813. Russians and Prussians versus French; claimed by both sides as a victory.

† 16th and 18th October, 1813, same combatants—Allies victorious.

There are moments in which we should not fire, or only very slowly, and others of a critical nature in which there should be no question of saving ammunition; but the latter are only of short duration, and they do not lead to a lavish expenditure of ammunition; while the inefficient constant fire at long distances generally has that effect. The higher it is necessary to raise the tangent scale, the more must the ammunition be spared, and this must be especially attended to with detached batteries.

8. *Refit of ammunition and losses in action.*

The limber ammunition of a battery under fire, when half expended, must be replaced by advancing a waggon from the first detachment. The commander of the battery must pay the greatest attention to this point, and for this purpose must take advantage of the pauses which occur in every long engagement, during which the fire is silent, or only languidly sustained.

The losses in men, horses, and rolling stock will be made good in the following manner:—

The non-commissioned officer at each piece meets the first loss by a circumspect use of the means at his disposal, and an equalisation in the division is not to be made until those means no longer suffice.

If the deficiency in a single division is so considerable that the officer in charge is unable to meet it, he informs the commander of the fact, who orders an equalisation in the battery, as far as the means of the battery inclusive of its waggon detachments go. By this means, temporary inefficiency for action is avoided.

Men put *hors de combat* are replaced according to the provisions of the drill regulations: first by the spare numbers at the pieces, and afterwards by drafts upon the battery reserve.

The service of the pieces is uninterrupted as long as there remains, with the 6-pounder, four men, with a 12-pounder and howitzer six men, a further loss is at once supplied by the non-commissioned officer, a middle rider, or a horse holder. In cases of necessity, one man must do the duty of several numbers. A pole rider or leader rider is replaced by the middle rider, whose horses will be driven by the cross rope rein.* Horses placed *hors de combat* are replaced by the spare horses of the battery, and when they are insufficient, by a portion of the teams of the empty ammunition waggons; in urgent circumstances by the non-commissioned officer's horse in the foot artillery, and by the gunners' riding horses in the horse artillery.

Dismounted non-commissioned officers in movements of the battery mount the off leader, and dismounted gunners in the horse artillery mount on the limber.

It should only be in a case of the greatest necessity that the commander resolves upon sending back any of his pieces from the battery in action, because this measure weakens its fire, and creates an unfavourable impression on the rest of the troops; pieces which have been injured must, therefore, be made fit for service in the battery, if this is impracticable, they retire to the first detachment of waggons, in order that the necessary materials for their immediate repair may be got from the store cart. Should a sudden great loss take place amongst the draft horses, a portion of the teams of the guns which have been sent to the rear are employed to replace them. The harness and saddlery of horses that have been killed, are conveyed to the rear in the empty ammunition waggons to the second detachments, or, when practicable, they are taken away on the gun limbers.

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* Vide page 44.

Pieces, whose carriages have been seen so much injured by shot, as to be incapable of bearing them, must be tied under the limbers; the elevating screw, implements, and wheels, when possible, should be taken away.

Gun limbers which have been rendered useless are replaced by the waggon limbers, the waggons are attached behind others.

SECTION 13.—CONDUCT OF THE AMMUNITION COLUMNS, WITH REFERENCE TO THE REFIT OF AMMUNITION, AND THEIR TACTICAL FORMATION.

The ammunition columns follow the bulk of the army-corps, under the command of a staff-officer, usually at a distance of one day's march; but when a general action is anticipated, some of them are advanced closer, in order to supply the troops with the requisite ammunition.

The columns, thus advanced, take up their position about half a mile* from the field of battle, behind defiles or other suitable points on the main road, in the rear of the army-corps. The spot upon which they stand must be made known to all the commanders of the batteries and battalions, in order that the empty waggons may be sent to join them.

The fresh supply of ammunition is furnished by the commander of the column, who takes a receipt for it: it is effected by unpacking the ammunition, an operation which is easily performed with the battalion small arm ammunition waggons, by exchange of the boxes of the empty and full waggons. For this purpose each detachment of troops has its own waggons, horses, and men, and it is only in extreme cases that this system is departed from.

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* It must be borne in mind that the Prussian mile is equal to 4·67 English miles.

The advanced columns are only to quit their position at the express order of the commander of the artillery, the remainder await for orders in a position more to the rear. If there has been a heavy expenditure of ammunition in a general engagement, the ammunition columns replenish their store either from the reserve ammunition park, which carries a second full supply, or from the intermediate depot, which is located on the hither side of the grand depot, whence it draws its requirements in material and made-up ammunition.

Lest the communications with the rear should be cut off by the enemy, each army-corps has the means of furnishing itself with fresh ammunition from its laboratory columns.

Each ammunition column, consisting of 32 carriages, is divided into detachments of 16, eight divisions of 4, and 16 sections of 2 carriages. The first detachment is led by a sergeant, the second by the second in command of the column, each division by a non-commissioned officer, and each waggon by a gunner.

Position. In park and for inspection, it is formed by detachments in two lines, one behind the other, each carriage with 10 paces interval, according to their ordinal numbers, the second detachment with 10 paces distance from the first. The interval of 10 paces between the carriages is kept up under all circumstances, even in evolutions. The commander is posted at 8 paces in front of the leader of the first detachment, who is 4 paces in front of the commanders of divisions, the latter are 2 paces in front of the men in charge of the waggons, who again are 2 paces in front of the riding horses.

The bombardier told off to each division is posted on the right, and near the gunner in charge of the first waggon in front of the leaders; the driver, intended to assist the non-commissioned officer, near the gunner in charge of the last waggon of the division in front of the leaders. The buglers on the right flank of the first detachment dressing by the gunners in charge of waggons at an interval of 5 paces. The sergeant-major brings up the rear of the 3rd division, the head fireworker that of the 7th. The spare horses stand in the first rank on the left, near the baggage waggon. The farrier and saddler on the left, then the surgeon, and the remainder of the men in a single rank on the right, near the baggage waggons.

Dressing. The bombardiers, the gunners in charge of waggons, and the drivers on foot, form the points.

Paces. The movements are always at a walk, but in forming a column of subdivisions, in wheeling by sections or divisions on their own ground, in marching obliquely from columns of subdivisions into sections or divisions, or out of column of sections into that of divisions, the trot is the pace used.

Movements in line only occur for short distances, but are usually performed in column of subdivisions, of sections, or of divisions. Sharp turns are to be avoided, turning to the right and left may be done by single carriages, and a complete turn by reversing.

Reversing. If an ammunition column in line is to reverse, it cannot be done from the halt, because the intervals between the carriages consist only of 10 paces. The even numbered waggons advance 20 paces beyond the line, and on the word "march," reverse at the same time as the uneven numbered waggons; on the word [illegible]" they advance into the line.

Wheels. Quarter circle and one-eighth circle wheels are only made in sections or divisions.

Closing the intervals is not practised in standing columns, but only by sections and divisions for passing defiles. The close intervals are at 5 paces.

Formations. Column of subdivisions is the usual formation on the march on high and cross roads, with 4 paces distance. Columns of sections in the open field with 4 paces distance. Column of divisions is employed on open even ground, with 20 paces distance, and close columns with 4 paces distance, in both cases with 10 paces interval.

The deployment of the columns is executed as in batteries.

SECTION 14.—CONDUCT OF THE ESCORT FOR THE PROTECTION OF THE BATTERIES.

As the foot artillery is not armed with the bayonet, it is defenceless while moving, against the attack of infantry and cavalry. The horse artillery certainly are capable, under certain circumstances, of defence, by using the gunners as cavalry, but they can only cope with an enemy in small numbers.

When the artillery is unlimbered and in action, it can only command the ground in its front, while its flanks are exposed to a sudden attack. It requires, therefore, the protection of other troops, both when in movement and in position for action.

So long as it is in immediate connection with large detachments of troops, when on the march near the enemy, they afford the artillery sufficient protection; should it, however, be detached farther than would admit of immediate support, whether it be on the march to avoid impracticable ground, or to take up a position in front of or on one side in an action, it requires an escort to ensure it against the attacks of the enemy's riflemen, skirmishers, and small bodies of troops.

It is to be a standing rule, then, that such an escort is detached from the batteries of division when going into action, in order to ensure sufficient freedom in the choice of positions for opening fire. The only exception is that of large masses of artillery of reserve, which always go into action associated with the infantry and cavalry of reserve, and which always remain in close alliance with it.

In ground affording cover, the escort is best composed of infantry with rifled arms; in open ground, of cavalry. This holds good both for horse and foot artillery.

The escort is estimated at a squadron or company per battery, and its formation, whether in line or column, is determined by its commander, according to the rules which obtain in his Arm.

In order that the escort should fulfil the above explained purpose, it must always accompany the battery, never forsake it, and risk all for its preservation. Its movements and positions are at all times directed solely by those of the battery, and it must always place itself in such a manner that it can engage under the most favourable circumstances.

On the march the artillery always accompanies the bulk of the troops. Should it march exceptionally only accompanied by its escort, it devolves upon the latter to form advance and rear guards to ensure its safety; it undertakes the patrolling to the front and on the flanks, and marches with its main body at a musket-shot's distance from the battery, on the side next the enemy, whether in front, rear, or flank.

Should the escort come unexpectedly upon the enemy, it advances upon him with the men in skirmishing order, and diverts his fire from the battery; if the escort is of infantry, it seeks to make the most judicious use of natural cover, of an attack in line or column, according to the strength and position of the opponent; if of cavalry, of a charge.

The artillery must leave it to circumstances to determine either to support its escort in the engagement, or to retire under its protection.

On the field of battle, the escort should observe the following rules:

1. When the battery advances in line for action, it should follow in rear of the flank most threatened, or in rear of both flanks, never in rear of the centre of the battery.

2. If the enemy's light infantry or mounted skirmishers hinder the battery by their fire from taking up the position ordered, the escort immediately engages them, in order to dislodge them.

3. When the battery has taken up its position, the escort occupies the ground which the enemy held in the preceding skirmish, places sharpshooters on the exposed flank of the artillery position in every available cover; the main body remains, however, in close order and takes up a position for the protection of the battery, at the distance of a gun interval from the flank piece, and about 100 paces back from the line of the pieces.

In uneven ground, or in ground much cut up, the distance of the available cover determines whether it shall be taken advantage of or not: it must not be used if placed at a distance beyond that which will admit of the escort affording an effective protection to the battery.

Positions of the escort behind the battery or between the intervals of the pieces are bad: for, in the first case, they only serve to stop the enemy's shot,* and in the latter they are in the way of the men serving the pieces.

4. Should the battery in position for action be attacked by the enemy's infantry or cavalry in front, the escort waits to see whether the battery beats them back by its fire, and on this account remains passive until the enemy shall have penetrated into the battery. It then advances in close order between the intervals of the pieces, and attacks the enemy, while in disorder, with the bayonet and without firing, in order to thrust him back. Should this be accomplished, the flying enemy should not be followed beyond the muzzles of the pieces, for otherwise the escort would mask the fire of the battery, which is immediately reopened, and which is far more effective than theirs.

Such attacks are not usually made on the front alone of the battery while firing, but simultaneously on the flanks; the commander of the escort should, therefore direct his particular attention to this point, and to meet such an event should post a detachment of his men in close order on the exposed flank.

5. Should the battery be attacked in flank, while firing, the division on the flank attacked wheels backward with the prolonge and receives the enemy with canister shot fire, which the nearest pieces endeavour to support by an oblique round-shot fire. The escort awaits the arrival of the enemy in close order, in rear and at the side of the flank, and attacks him as soon as he reaches the pieces. The infantry fire a salvo at a short distance, and then advance to the attack with the bayonet; the cavalry attacks the flank of the opponent without regard to his strength.

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* The word in the original is "Kügelfang," a graphic word which is not easily translated, but by the colloquial expression above made use of.

The enemy, thus repulsed, as in the front attack, is only followed up by the canister shot fire of the battery, and not by the escort.

6. Should the battery quit a position in action, to take up one lying further to the rear, the escort must not retire at the same time as the battery, or follow it too quickly, but should hold its ground as long as necessary, to give the battery time to retreat.

The escort, in its turn, afterwards retires to the new position, but must so direct its march to the flank, that it may not mask the fire. Finally, it places itself in its former relation to the battery.

The escort should look upon its charge of covering the artillery as a most honourable duty; the artillery must not rely entirely upon its protection, but should provide for its own safety at all times by a close observation of the enemy and by a well timed and effective fire.

SECTION 15.—CONDUCT OF THE ARTILLERY AFTER AN ENGAGEMENT.

After the engagement it should be the chief care of the commander of a battery, to put his battery as soon as possible once more into a condition to march and fight, to replace the losses, and to repair what has been injured.

Thereto appertains:—equalising the men and horses between the pieces and waggons; packing the gun and howitzer limbers with ammunition from the waggons, and dispatching to the rear the empty waggons to the nearest ammunition column, with a written letter of advice, in order that he may have his wants supplied; making use of captured ammunition when it fits the pieces and is in good condition; instant refitting of injured pieces and waggons by the artificers, using the available stores and materials; exchanging the totally unserviceable gun and howitzer carriages and limbers for spare carriages from the ammunition columns; and sending back such portions as are incapable of repair in the battery, to the artificer's column.

As soon after the action as possible, a report of the losses which have been sustained, and a narrative of the fight will be presented to the appointed staff-officer.

The report should contain a nominal roll of men and horses put *hors de combat*, as well as a specification of the pieces or carriages which have been rendered unserviceable, or have received injuries; of the expenditure of ammunition, and of the stores of all natures which have been damaged or lost. In it, it should be stated, whether any, and if so how much, ammunition has been already replaced from the columns; what can be done towards replacing and repairing the injuries to the material of the battery, and what portions of that material it is requisite to have replaced. Finally, a short opinion of the capability of the battery for movement or action should be added.

The narrative of the engagement should tersely describe the participation of the battery in it, and should contain the following points: the "ordre de bataille," or specification of the troops to which the battery was attached, and of the commanders under whose orders those troops were placed; the general plan of the action, with a quotation of the special instructions communicated to the battery; the order of march, time of marching off, and of the commencement of the action; positions of the battery, with a statement of the neighbouring troops; the nature of the enemy's troops against which the battery directed its fire; the distances and nature of fire, and ammunition; of the effect worthy of remark, and the reason why the positions taken up were quitted; the behaviour of the men, and who distinguished himself; as well as all particular circumstances which could be observed in the proximity of the battery.

If divisions or half batteries were detached, it is to be added by whose order, and for what purpose they were so detached.

Separate narratives should be prepared by the commanders of pieces which have been independently detached during the action, these are annexed in original to the narrative of the commander of the battery.

CHAPTER IV.

THE USE OF ARTILLERY IN RECONNAISANCES, ADVANCE AND REAR GUARDS, SEPARATE EXPEDITIONS, DEFILE ACTIONS, LOCAL ENGAGEMENTS, AND FORTIFIED POSITIONS.

SECTION 16.—USE OF ARTILLERY IN RECONNAISSANCES.

The objects to be attained by reconnaissances are, to find out the position, strength, and designs of the enemy: they are executed by detachments told off for the purpose, in order to discover his situation in all respects, and to determine the operations suitable to the case to be undertaken by the main body.

When detachments are not especially formed for the purpose, it is the duty of the advance guard to reconnoitre the enemy.

As the above mentioned objects are seldom to be attained without a skirmish, termed "a reconnoitring skirmish," it follows that reconnoitring parties on a large scale should be composed of the three Arms. The artillery, composed of horse or foot artillery, according as the party is one of cavalry or infantry, undertakes the task of supporting the infantry when engaged; of expelling the enemy's advanced troops from any inequalities of ground which he may have occupied; or of accompanying the cavalry in any movement of circumvention which it may make for the like purpose; further, of opening an attack on the main position, and of covering the retreat.

It should only throw forward as many pieces as may be requisite to the attainment of the object in view, when engaged in driving back the enemy's advanced troops, and in skirmishing with small posts; as soon, however, as a clear view of the enemy is obtained and he is compelled to display his force, the engagement should affect a character of impetuosity, which must be only abandoned when superior forces are drawn out; it then becomes necessary to retreat.

SECTION 17.—USE OF ARTILLERY IN ADVANCE GUARDS.

The duties of the advance guard, are to seek out the enemy, to reconnoitre him, to bring him to action, and to give time to the bulk of the army to draw itself out in battle array, or to pursue the enemy after a victorious engagement.

It should be composed of detachments of all three Arms, in the proportion of from one-sixth to one-fourth of the whole force; it should precede the army at a considerable distance, at times as much as by a day's march.

Generally speaking the bulk of it is composed of infantry, backed by the requisite amount of cavalry; these proportions are inverted when a portion of ground lying at some distance in an open country is to be occupied in the face of an enemy, or when a disordered and retreating foe is to be pursued.

In every case, where the advance guard is mainly composed of infantry, foot artillery answers the purpose sufficiently well; for under the existing organisation it is amply endowed with the requisite capability of movement.

On the other hand, should it consist mainly of cavalry, or should an especial reinforcement of cavalry be attached to it, a proportionate number of horse artillery pieces should be detailed to it.

When an obstinate defence of individual posts occupied by the enemy is to be anticipated, half a 12-pounder or half a howitzer battery should be detached from the reserve artillery to the advanced guard; it should, however, return to its original position as soon as it has effected its object.

Taking no account of these exceptions, the advanced guard of an army-corps usually consists of:—one brigade of infanty, one regiment of cavalry, one 6-pounder foot artillery battery.*

Of which, by way of example, one-fourth should be in front, one fourth on the flanks, and one-half would form the main body: or, in detail—

One battalion and one squadron in advance.
One battalion and one-half squadron on the right flank.
One battalion and one-half squadron on the left flank.
Three battalions }
Two squadrons and the battery } forming the main body.

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* An army-corps in the Prussian service in time of war consists of 30,000 men, in round numbers: its advance guard will then be composed of 6000 bayonets, 700 sabres, and six 6-pounder guns and two 7-pounder howitzers.

No pieces should be detached to the advance or flank detachments, because they are rarely of use in those positions, and because so situated they are much exposed and may easily be lost.

The whole battery should remain with the main body and march with its pieces and waggons in one column in rear of the first battalion, so that it may come quickly into action.

When the advanced troops discover the enemy, the main body should deploy from the column of march to support the attack of the advanced troops, or to cover the retreat; moreover, the battery should put itself into fighting order, and form its waggon detachments.

The commander of the battery, who, up to the present moment, has remained close to the chief of the advanced guard, should ride up to the advanced troops to gain information as to the strength and position of the enemy. Should the enemy's columns advance into range or throw forward artillery, or where defiles are to be forced, he joins his battery, and leads the whole or a part of it at a fast pace, his men being mounted, into a position which he has been careful previously to fix upon; it opens the engagement for the main body, and covers the advanced troops under protection of its escort.

The entire battery should only be ordered under fire when the whole strength of the enemy has been discovered, and when it is intended to dislodge him by a sudden attack in superior force. If this is not the case, he should be advanced upon without showing the whole strength; the artillery should only be sparingly used, and one portion of it be kept in reserve to be disposed of according to circumstances.

The battery of the advanced guard will, generally speaking, act rather by divisions or half batteries than in a mass, for the purpose of affording a judicious support to the troops; this must especially be the case when the ground is rugged.

When the other Arms of the main body of the advanced guard share in the contest opened by the artillery, the latter should close in to the former as they approach the enemy; in other respects it conducts itself in all the details of the action as artillery of division.

Should the advanced guard have engaged itself so deeply as to entail the bulk of the troops being brought into action, or should it have retreated before a superior force on the chief position of the main body of the army, it must either take up its position in the line of battle or go to the reserve. In the latter case, its artillery should turn to account the succeeding pause to complete its ammunition from the ammunition columns, and to repair damages to the best of its ability.

The duty of the artillery of the advanced guard is attended with fatiguing marches and a state of constant preparation for action; the skirmishes are often of an obstinate character, and must not unusually be fought against superior numbers; it should, therefore, endeavour to compensate for its inferiority in number of pieces, by exercising a solicitous supervision over its material, by diminishing the chances of loss through a judicious use of the ground, and by a proper employment of its fire.

SECTION 18.—USE OF ARTILLERY ON REAR GUARD.

A rear guard is formed either on the advance or on the retreat. On the advance its strength is dependent upon the presumed safety or otherwise of the march.

Should the march be considered safe from interruption, the rear guard consists of a small body of troops following in rear merely to keep up discipline; if the case be otherwise, it is composed of a larger body of troops, divided into rear, flank, and main body.

On a retreat all the three Arms are represented, more especially after a lost battle, so as to cope with the hot pursuit of the enemy, and to discover in time his efforts at circumvention and flank attacks.

It should be proportionately stronger than the advance guard, and ought to amount to at least one-fourth of the whole body; further, it should act, as much as possible, independently, so as not to be involved in action with the main body. Its part in action is of a defensive character from the nature of the case; but this should not prevent it opportunely resuming the offensive, if a favourable chance present itself; for absolutely defensive tactics are at all times ruinous, and on a retreat depress the spirits of the troops.

The best Arms for persevering and obstinate combat are riflemen, infantry with rifled arms, and light foot artillery; and for the support of such a combat, cavalry and horse artillery are the best troops to employ to make sudden attacks.

Horse artillery can hold its ground when menaced, longer than foot artillery, and it can withdraw quicker; in conjunction with cavalry it can inflict short offensive blows, or can lie in ambush, when the ground is favourable, so as to repulse an unwary enemy with loss.

Detaching horse artillery, which is only the exception with advance guards, should, therefore, be considered the rule with rear guards.

The rear guard follows the main body upon the same road; it keeps off the enemy without permitting itself [illegible] driven forward on the main body; it, however, continues in alliance with the latter, and engages in serious combat until the main body shall have safely traversed strong defiles, and until it has posted itself to advantage on the other side of them.

The conduct of the artillery of the rear guard on a retreat assimilates itself to that of the division artillery; it must be careful not to separate itself by too great a distance from the other Arms, but, on the contrary, to be always in the closest alliance with them.

When there happen to be defiles on the line of retreat, such as are capable of being defended for a long time, they should be occupied by the artillery of reserve, either 12-pounders or howitzers. They cover the retreat of the advance guard, and give a new and often a decisive vigour to the retreating fight, and form a timely reinforcement to the rear guard; they should return, however, to their original position in the reserve, as soon as possible after the object in view has been attained.

The duties of the artillery of the rear guard are more arduous, and demand greater efficiency and endurance, than do those of the artillery of the advance guard; it should, therefore, be equally careful in its conduct and of the good order of its material, more particularly as regards thrift and judicious expenditure of ammunition, for replenishing the waggons from the ammunition columns is a matter of the greatest difficulty, as they become momentarily more distant.

SECTION 19.—USE OF ARTILLERY IN SURPRISES.

Surprises may be undertaken against the enemy's troops when they are in camp, cantonments, or on the line of march. The preparations for this purpose should be made with the greatest foresight; the following are some of the most essential:—An accurate knowledge of the country, the road, and the enemy's camp, as well as his method of performing outpost duty. Since the latter is usually more circumspectly organised in his front and flanks, and that it is not unusually neglected in his rear, the surprise is generally made by getting round his rear, in order to effect it on the side where it is least expected. Strict secrecy, bad weather, darkness, neglect and errors on the part of the enemy, favour such an enterprise. The departure is usually at night, and the attack made towards morning. Artillery is only employed in surprises when made on a large scale, and it has the following part to perform:—To watch the result in a retired position in the reserve; to assure the issue of the enterprise, or to take part in the attack at daybreak; to improve the occasion in a successful issue, and to keep off the enemy's supports; when, however, the enemy appears in overpowering numbers, to cover the retreat.

If the enemy's troops are to be taken by surprise on the line of march, it is usually from an ambuscade; the artillery should pursue the enemy hotly after a victorious combat.

Horse artillery and cavalry are best adapted to this species of surprise.

When on the defensive in a surprise, the artillery should make ready for action with all possible speed and join the first organised body of troops that it falls in with. Its reunion into masses of batteries is not unfrequently the only means of covering the retreat, of affording points of support, and rallying points to the broken troops in their confusion, and of making head against the pursuit. In the battle of Hochkirch,* the bloodiest surprise that history affords, the King endeavoured, as soon as the fog had cleared, to form a new line of battle, and lead in person the regiment of old Brunswick and ten pieces of artillery to the heights of Pommritz, which were already occupied by two batteries; his object was to give the infantry a point to rally upon. The well sustained fire of this artillery favoured the King's project so effectually, that he was enabled to form a fresh line of battle in rear of the village.

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* Battle between the Prussians under Frederick the Great, and the Austrians under Count Daun. The former were defeated. 14th Oct., 1758.

SECTION 20.—USE OF ARTILLERY IN PROTECTING CONVOYS.

Transport, consisting of rolling stock laden with material of war, ammunition, provisions, treasure, and the like, should have an escort suitable to its quantity and importance, as well as to the nature of the ground. The whole body is then termed a convoy. Large convoys are divided into columns of fifty waggons, subdivided again into detachments of ten; ammunition waggons should form a separate detachment with 300 paces distance. Each detachment should be closed up, and, when the roads admit of it, they should be two abreast. Broken down waggons ought not to be permitted to interrupt the march, but should be removed from the column, repaired, and brought up by the rear guard. The more valuable waggons march in front or in rear of the column, according to the direction in which the enemy may be expected.

Defiles should be passed by alternate detachments; in this method the uneven numbers advance, and the even numbers close up in closely formed rows to the right and left of the defile, they should stand behind each other at twenty paces distance; the uneven numbers form, in like manner, on the other side of the defile, and await the even numbers. In this manner the columns meet with no check, the order of march is retained, and the horses can be rested and fed.

The convoy should halt for the night in an open situation, which at any rate should be secure through the difficulties of the ground. It is formed in two ranks, the one behind the other, or in a square with the poles inwards, thus making a stronghold of the waggons.

To protect such a convoy is a task of great difficulty for the escort, because the latter is usually weak in numbers, and is distributed over a large space of ground; the assailant, on the other hand, is overpowering and concentrated.

In order to compensate for this disproportion, light artillery is attached to the escort, an Arm in which the assailant is usually deficient, as his troops are those peculiarly adapted to surprises.

One half of the escort should be employed as an advanced guard and as flankers, for safety's sake; the other half, to which the artillery is attached, should remain in close formation by the waggons. The advanced guard, provided with a detachment of pioneers, for the purpose of mending bridges destroyed by the enemy, and of clearing the road of obstacles, dislodges the enemy from any irregularities of ground occupied by him; the main body of the escort supports this operation or makes flank attacks on the enemy.

In case of a trifling attack, the convoy should continue its way; when the attack is in force, a standing fight should be made, during which the waggons should form a stronghold occupied by infantry in rear of the troops engaged—an arrangement which is especially useful against cavalry. This stronghold consists of two* rows of waggons, placed axle to axle, with fifteen paces distance between the two lines; around these again a waggon chain is drawn; in each row the pole of one waggon is run under the perch of the other, the horses and drivers occupy the open space between the two rows. The artillery should remain with the troops posted outside, which are to be used according to circumstances, or it takes post on the most accessible side and before the corners of the stronghold.

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* If the word "double" is inserted here, it will render this description more intelligible: it does not exist, however, in the original.

SECTION 21.—USE OF ARTILLERY IN DEFILE ENGAGEMENTS.

Defiles, as regards defence by artillery, may be divided into two classes; those which *cannot* be enfiladed from the hither side, and which only admit of being defended by artillery fire from a position situated on the side next the enemy; and those which *can* be enfiladed by pieces of artillery placed on the hither side of the defile. To the former class appertain mountain-passes, and roads through forests; to the latter, dikes, bridges, and causeways.

Defile actions are either fought independently or they form a portion of a general engagement; in both cases, however, they are the most important and arduous tasks of warfare, because upon holding or being driven from a defile mainly depends the decision of an action.

The occupation and defence of a defile is undertaken, in order to keep it open and secure it for the passage of our troops, either on the advance or retreat, or in order to bar the enemy's passage.

The road or passage of the defile is left practicable or it is destroyed according to the nature of the object in view; the measures adopted by the defenders are dependent upon the nature of the defile and the temporary scene of action, especially those having reference to the selection of position.

If time and means admit of the defender's preparing a position, of turning the natural cover afforded by the ground to account, and of creating artificial obstacles, so as to enable him to await the enemy in a fortified position and to make use of his fire-arms in moderate security, under such circumstances he has the advantage of the enemy as long as that enemy is not in very overpowering force.

Under these auspicious circumstances, we may pronounce the defence to be the superior. We must, however, remind the defender that his weak side is the distribution of his force, and that he has to defend most assiduously ground of great extent, the occupation of which is beyond his means.

The obstinacy of the resistance is dependent upon the object of the engagement, the nature of the defile, and the possibility of its being turned. Defiles which can be easily turned are difficult to hold. To warrant a somewhat powerful resistance they should be incapable of being turned under a distance of half a mile.* Care should be taken to occupy, or at least to observe flank defiles.

1. *The defence of defiles.*

The defender may take up his position in front, in or behind the defile.

(a.) *Defensive action in front of a defile.*

In this case the defender, being confined to a narrow space, is in an unfavourable position; because the assailant can encompass him, drive him back with a superior force into the defile, penetrate into it with him, and nullify the defence on the other side; under such circumstances the losses are great. Nevertheless, such positions must sometimes be taken up: for instance, when it is not thought desirable to surrender without a struggle the entrance of mountain passes or forest roads, such as cannot be enfiladed from the rear, and such as can only be defended by a position on the enemy's end of the defile; or when, after a lost battle, the line of retreat leads through a defile, the approaches to which must be defended by the rear-guard until the whole army has passed through, or until the arrival and retreat of detached bodies of troops.

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* Vide note, p. 86.

In all such cases, the defender must be guided in his line of conduct by the possibility of making a retreat in good order, and of performing his arduous task with the smallest sacrifice. He should not, therefore, have more troops, especially artillery, posted in front of the defile than are indispensably necessary, and they should commence their retreat as soon as the object in view is attained. The weaker the position intrinsically the more difficult is the retreat into the defile, the less capable is it of defence from within, the less obstinately can it be defended, and the more is a hand to hand combat to be avoided.

A most powerful fire is, therefore, the main stay of the defence.

Should artillery be employed in front of the defile, its duty is by no means to engage the superior strength of the artillery of the enemy, but to keep off the direct attack of the enemy's troops on the position. On a retreat, the heavy batteries are sent through the defile, and only light batteries remain behind for the defence in front; these, again, send forward their second detachment of waggons through the defile, and merely retain the first in their vicinity, with a view of not encumbering the passage.

The position of artillery in front of the entrance should be taken up on one side of it, because a position immediately in front of the entrance has these disadvantages, that the retreat of the troops and of those driven back by the enemy masks the fire of the artillery, and the shots aimed at the artillery by the enemy enfilade the defile. The available artillery should be thus disposed: the light pieces are thrown forward, under suitable cover at favourable points, to enfilade the approach to the entrance, and to ensure the flanks, by this means a more sure retreat is practicable; the great mass of the artillery is, however, reunited in a position on one side in one long battery, and, lastly, a few horse artillery pieces are kept in reserve, under cover of the ground when possible, to make flank attacks. Obstacles are thrown up within canister shot fire of the position.

When time and means admit of it, throwing up a breastwork, or making cuttings to cover the pieces should not be neglected; the ammunition waggons should be posted in rear of the batteries under cover of the ground; and where it is possible, roads should be made in rear of the batteries communicating with the main line of the retreat, by the filling up of ditches and the like.

The artillery of the defence should only discover itself when the enemy comes within effective range. It should avoid unnecessary changes of position and manœuvres which interrupt the fire. The heavy guns take up a concentric position in rear of and facing the mouth of the defile, in order to insure the retreat and to prevent the enemy from debouching, should he have succeeded in forcing the defile. If the defile can be enfiladed from the hither end, the defence gains notably in strength, by placing the heavy batteries, on commanding points, on one side of the mouth of the defile. Their fire supports the defence of the ground in front, and impedes concentric attacks on the defile, owing to their flanking position.

It was thus that the Russian batteries fired from the right bank of the river Alle at the battle of Heilsberg,* taking St. Hilaire's division in flank as it attacked the entrenchments on the left bank opposite the town. The division was so roughly handled by it, that it retreated in the most complete confusion.

Should the enemy attack such a position, it is usually after a cannonade, succeeded by a skirmish of sharpshooters, and finally by an advance of storming columns. The artillery of the defence certainly cannot always avoid the combat, especially when that of the assailant endeavours to prepare the way for the attack of his infantry from close quarters, and to shake the troops on the defence. It replies to the cannonade, then, with the pieces placed on the other side of the defile, but always with a scantiness of fire which the main object of its task demands, and repulses the enemy's storming columns with its fire. If the standing character of the defence is capable of support by a short return to the offensive, in which cavalry and horse artillery break forth suddenly from behind some covering elevations of ground, and fall upon the flanks of the advancing columns of attack, it is quite possible by this means to cause the enemy, already somewhat shaken, to suffer a total defeat: it is important, though, to await the happy moment for the purpose, and by no means to undertake such an offensive stroke too soon. We must here remark that it is not improper that every species of offensive movement should be made by the cavalry and horse artillery in front of defensive positions, into which they can retreat when beaten back. It is of great consequence that the horse artillery should make its attack on the flank of the assailant's columns with the greatest velocity, and throw in canister shot from close quarters, in order to render the success of the cavalry indubitable, while a mere round shot fire under such circumstances would be ineffectual.

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* Battle between French and Russians, the former being victorious. 10th and 11th June, 1807.

The foot artillery should ply the heads of the attacking columns with the greatest vivacity, and advance once more into action such pieces as may have been compelled to retire owing to the superior fire of the enemy. If the assailant advance in very superior force into action, the retreat should be commenced with order. The most exposed flank is first retired.

The artillery retires successively with the infantry, and by no means together with it, because this would damp the courage of the troops; on the contrary, several light pieces should hold out to the last, to keep the enemy at a respectful distance, and then should retire just before the last battalion.

(b) *Defensive action in a defile.*

In a defile the position of affairs is much more favourable to the defender than when in front of one, because the assailant cannot make use of his superior strength, nor can he envelop the defender, and can only advance on him with an equal front; to the latter, also, previously constructed obstacles and other means of fortifying his position are available.

Engagements on a large scale cannot take place in a defile, for there is not room to draw up many troops in position. They are generally fought for the purpose of gaining time, either in mountain passes, in forest defiles as rear-guard actions, or when the defile is long, roomy, and not to be turned; the employment of artillery, however, is only to be recommended in the rarest instances, and when employed is seldom of much use, in consequence of the smallness of the field of view and of fire; its participation in the combat must be renounced, if the passage is narrow and rugged, since this Arm experiences the greatest difficulty in getting away from such a position; and it may be the cause of the most dangerous crisis, by blocking up the road with its material. Should the artillery, nevertheless, be employed in the defence of a defile from the inside, we should be satisfied with the minimum of pieces, send back all unnecessary waggons, have a good wide road for retreat, or be prepared to expose a few pieces to capture.

The most favourable point for a position is that where the defile contracts towards the enemy and widens out to the rear, where the ground rises gradually, and where a side defile, opening out on the main one, offers a flanking position; such a side defile should, however, have a safe communication with the main defile.

At the narrowest point obstacles, and, when possible, entrenchments, should be thrown up, the defence of which should be supported by riflemen posted on the elevated sides of the mountain pass. The columns of infantry are posted on the commanding points of the defile, with the artillery in such a position as to enfilade the defile lengthwise with its guns, while its howitzers shell from flanking positions that part of the defile which has been abandoned, and which is occupied by the enemy.

The cavalry and horse artillery are only to be used when broad valleys are to be defended; when this is not the case, both Arms retire behind the defile and join those troops, whose duty it is to prevent the enemy from debouching in case of a retreat.

(c) *Defensive action behind a defile.*

The position in rear of a defile is the most advantageous one for the defender, and the circumstances are, on the whole, not more favourable to him than they are unfavourable to the enemy. He embraces the mouth of the defile with his position, he is possessed of all the advantages which a greater extent of front affords, he commands the defile and its exit with his fire, and has a safe retreat. This situation is all the more favourable when the defile can be enfiladed, and when the ground in front of it can be commanded by artillery placed in suitable flank positions, and this is usually the case, especially with bridges, dikes, and causeways. Bridges and causeways are most effectively defende when they lie at the concave* bend of a river. In the defence of defiles from a position in rear of the mouth, the artillery is the most effective Arm, for the fire of its pieces commanding the defile and its opening, is always the most powerful means of impeding the passage, and of rendering the deployment of the enemy's troops for action more difficult.

In consequence of the large space which the position behind a defile affords, the necessary discretion can be used as to placing the artillery, and a reciprocal support of all three Arms may be expected.

The defender has two principal objects to effect with his artillery,—the one is, to enhance, as much as possible, the difficulty the assailant will find in deploying his artillery for the protection of the passage,—and the other, to impede the passage itself.

For the first object, he should place his heavy batteries upon such commanding points as present themselves; for the second, he should select artillery positions close to the mouth of the defile, partly because the nature of its sides is generally unfavourable to a distant position, and partly in order to ensure his fire taking effect on the assailant's troops which have passed or are about passing through.

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* Bending towards the defender.

For the latter purpose, the artillery should form a large battery at about 600 paces behind the mouth of the defile, to enfilade it with round shot and shrapnell, to hurl back the debouching columns with canister shot fire, and to repulse the attack with the steel. In order to confine the enemy's troops, which in despite of everything may have forced the defile, as long as possible to the narrowest limits of action, and to prevent their deployment by an annihilating fire, light batteries should be advanced into flanking positions, such as do not expose their flanks to the enemy's artillery: the horse or light foot artillery, which should be kept in reserve, must suddenly burst forth and advance up to canister shot range on the flank of the advancing troops, which they should throw into confusion by a short but lively fire, and thus give a favourable opportunity to the advancing cavalry to make a victorious charge.

The howitzer battery of the reserve shells the parts of the defile occupied by the enemy.

The artillery of the defence has to consider, that it will have to do with a courageous and very superior force of the enemy; it should select its positions, therefore, with the most careful consideration of the advantages which the ground may hold out and whenever time admits of it, it should throw up artificial cover for the protection of the positions decided upon, such as cuttings and earthworks.

The position so prepared beforehand should not, however, be occupied until the enemy shows himself within the range of effective fire, and then only by single batteries, as the circumstances of the engagement develop themselves, so that the enemy's reconnaissances may not discover the amount of the disposable force at too early a period, and that he be not prompted to effectual antagonistic measures.

The defender should never, in the preliminary arrangements or during the development of the engagement, place his whole artillery in position; but, on the contrary, he should keep in reserve, as long as possible, a portion of it for the decisive struggle; for a sparing use of force on the defensive is of still greater importance than it is on the offensive.

The main point to be observed in the defence is always to have a concentrated fire upon the opening of the defile, and upon the close columns of reserve advancing to the attack with the steel; and the difference between this and the defence in front of the defile is, that in the second case the defender should avoid direct contact with the assailant's troops, and in the first he should seek it, because all the advantages are in his favour.

2. *The attack of defiles.*

There are two methods by which the assailant may bring a defile engagement to a successful issue, without making too great a sacrifice; the one is, by turning the defile, and the other, by a superior force of artillery.

Where turning a defile is possible without great loss of time, and without running too great a risk, this method should have the preference, as the least bloody and the most promising of success; for if it is undertaken with a superior force it must always place the defender in a very precarious position, when he is kept in play in front and simultaneously prevented from effecting a seasonable retreat in rear. Where, however, the defile must be forced, a superior force should be placed in action in its front, and this force should be especially provided with a superior artillery.

No delay in bringing it into action at once should be permitted; and this is one of those cases in which a part of the reserve artillery should be brought into action at the beginning of the fight, in order to shake the enemy in his position by a concentrated fire, and to protect the infantry. The general rule of the successive employment of the force would, under such circumstances, be erroneous.

One of the most instructive examples of this nature is the manner in which the Russian artillery was handled in the battle of Ostrolenka.* The action commenced by the advance of 26 pieces at a gallop, under Prince Gortschakoff; their concentrated fire compelled the advance-guard division of Kaninski, posted on the right bank of the Narev to retreat, whereupon the Russian division under Norbakoff took the town with the bayonet. The monastery church-yard, though stoutly defended, was taken with the assistance of 2 pieces; while 9 others, by their fire, prevented the bridge over the Narev being destroyed. On the Russian bank to the left of Ostrolenka 34 pieces were placed under General Toll, and on the right of it 32 under the General of Artillery Gerbel II. The remarkable effect of these pieces, covering the flanks of the Russian troops which had crossed, thwarted all the efforts of the Poles to drive them back; and to it the gain of the battle is to be attributed.

(a) *The attack in front of a defile.*

Should the advance-guard, when in pursuit of the enemy, arrive simultaneously with him in front of a defile, so that he has not time to make preparations for a powerful defence, and that he can only make a retreating fight of it, the assailant should reunite all his disposable force for a concentric attack, in order to enter the defile with him on his overthrow; for this sort of action, horse artillery and cavalry are best calculated to do good service.

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* Battle between Russians under F. M. Diebitsch, and the Poles under Skrzynecki; the former were in reality victorious, though the Polish general claimed it. 26th May, 1831.

Should, on the other hand, the assailant find the enemy in a well ordered position, fortified by natural and artificial cover, the former must decide upon a regular attack, the usual course of which is to be undertaken inversely to the rules recommended for the defender.

The defence in front of a defile is based upon a powerful fire, avoiding, as much as possible, a direct artillery engagement and hand-to-hand combat. The assailant should therefore seek an artillery engagement; and after annihilating or driving back the defensive artillery, he should direct the fire against the infantry, and, after sufficient preparation, proceed to the attack with the steel.

To ensure the advance and deployment of the columns, it is generally necessary to open the affair by a strong battery, for the purpose of diverting the enemy's fire from the infantry. It was after this fashion, at the battle of Heilsberg on the 10th of June, 1807,* that several batteries under General Dulauloy, posted on the heights of Bevernicken, covered the advance of Soult's corps by their lively fire, as well as the formation of St. Cyr's division into storming columns; whereupon the attack and capture of the defile ensued, the fruit of their conjoint efforts.

The attack should be opened in front by heavy batteries, placed, as much as possible, in the prolongation of the defile; they should be reinforced by the howitzer battery when the enemy's pieces show themselves in covered positions. Under protection of this fire the batteries of division should be deployed against the flanks of the enemy's position; their positions should be chosen so that the direction of their fire strikes the mouth of the defile, and that they are not taken in flank by the enemy's artillery.

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* Vide note, p. 109.

The locality itself must decide whether the enemy's position is to be forced in the centre or overpowered on a flank; generally, the latter is the most advantageous; under such circumstances, however, it is necessary to deploy batteries, for the especial purpose of diverting and powerfully keeping under the fire of artillery from flanking positions.

As regards the judicious posting of the batteries, the commanding points will generally be found to be preferable; to be particularly advantageous, they should be situated at a moderate distance. The first artillery positions should not be selected beyond 1000 paces, because it is not a long cannonade, but a sharp decisive fire of artillery which is in favour of the assailant; and because the points to be aimed at are small and under cover. The greater the superiority of force, the sooner should the decision of the engagement be sought; and therefore the batteries deployed should be pushed forward by echelons up to 800 paces from the enemy's position. The horse artillery batteries should be kept in reserve, to oppose the offensive sallies which may be anticipated from the defender. As soon as he begins to withdraw his pieces, the artillery should concentrate its shrapnell and canister shot fire upon the enemy's infantry, and on the mouth of the defile; it should approach as close as the enemy's pieces and the nature of the ground permit.

The artillery, when energetically handled, will have sufficiently prepared the way for the assault of the infantry, which should then follow; the former should not, however, without further consideration, join the pursuit into the defile. It should, in most cases, be satisfied with the results gained by the victorious attack in front of the defile, and only in rare instances be induced to pursue the enemy out beyond the defile.

(b) *The attack in the defile.*

In such an attack it is rarely that artillery is used, as explained in the principles of its defence. The assailant is no longer in the same advantageous position as when in front of the defile; and in this case there can hardly be a question of his being able to encompass the defender.

Should the assailant come upon the enemy in a previously prepared position armed with artillery, there is nothing to be done but to dislodge his artillery with the like Arm; the requisite superiority, when the space for deployment is restricted, can only rarely be obtained by placing a greater number of pieces in battery; consequently, heavy calibres and howitzers have especially to make their superior weight tell.

(c) *The attack behind a defile.*

In this engagement the assailant is situated in the most disadvantageous circumstances possible. The disadvantages of the situation may be so much against him, that no superiority in numbers can ensure a successful result. This is the case when the defender's position commands that of the assailant, and when the *line of the defile* is such that enfilading its exit with a *superior fire of* artillery from the assailant's side appears to be out of the question. Should the attack of a well-ordered position behind a defile, sufficiently armed with artillery, be undertaken with ulterior views, there is only one line of proceeding open to him, viz: to hinder the defender from making attacks in close order with cavalry and artillery on the troops which have first got through, by commanding the ground in front of the mouth of the defile with a powerful embracing fire of artillery.

It is of no less importance to engage the enemy in an artillery fight, thus wasting his strength and powerfully diverting him from the defence of the mouth of the defile. It would, therefore, be advantageous to the fulfilment of both objects, to establish powerful batteries of heavy guns and howitzers, placed at points to be determined by the enemy's position and locality, and, when possible, within short range.

The advance and deployment of the infantry in front of the defile can only take place after these batteries have got fairly into action. As soon as the infantry has passed through, it should endeavour, as soon as possible, to gain ground to the flank and then to advance. To furnish it with an adequate intensity of force, and to enable it to repulse the attacks which it must expect, it should have a powerful artillery of division attached to it, in alliance with a sufficiency of cavalry. To secure a position on the flank of the exit of the defile, light foot artillery, and when necessary, single pieces at a gallop, should follow the first battalions which have got through, but only as soon as the latter have gained a firm footing on the opposite side, and have thrown out lines of skirmishers. They should be amply found in canister shot, and should keep close to the battalions: their duty is to increase the fire and to repulse the close column attacks of infantry and cavalry. It is true that the advance of artillery in front of the defile thus early is an evil, and it must therefore be dependent upon the feebleness of the attack at the moment.

When the mouth of the defile is sufficiently commanded by the artillery of the assailant, and that, consequently, his troops are secure from an attack in front, the defender will endeavour to try him in flank. It will be the care of the assailant to make seasonable dispositions to meet this contingency, and to keep horse artillery batteries in covered positions in rear of the defile, to be in readiness at once to meet such flank attacks with energy.

The cavalry should pass the defile, supported by a powerful fire of artillery posted in rear, under the protection of whatever cover may have been got possèssion of by the infantry and artillery. The three Arms thus re-united, should be gradually reinforced; they should endeavour to gain more ground to the front and flank, and finally, as soon as they outnumber the enemy, they should bring their momentum to bear to the overthrow of the enemy,

SECTION 22.—USE OF ARTILLERY IN AN ACTION AT ISOLATED FARM HOUSES OR MASSIVE BUILDINGS.

Isolated buildings and farm-houses not unfrequently acquire a tactical importance from their locality; they may either bar the passage of defiles, bridges, &c., or form advanced posts for a defensive position: the assailant is consequently compelled to attack them. They afford their garrison cover against musketry, canister shot, and shrapnell fire; and by judicious arrangement, occupation, and support, can make considerable resistance.

1. *The defence.*

Wooden houses, thatched with straw or roofed with shingle, are little or not at all adapted for defence; on the other hand, a complication of massive buildings, with the houses grouped, and surrounded with a strong and continuous wall, offers the greatest advantages for the object in view.

It should be prepared for defence on the principles of fortification.

The boundary wall forms the outer line of defence, the main building the keep. A judicious arrangement is to run a trench round the redoubt, to throw out *tambours* at the angles of the buildings, to crennel the windows, doors, walls, and roofs for infantry, and to organise the defence by stories.

Care should be taken to make ample provision of ammunition, food, and water.

The preparations for extinguishing fire should be entrusted to men that can be depended upon: for fire is the most dangerous enemy the defenders will have to encounter. The ground to the front must be cleared as much as possible; park enclosures and shrubberies in the neighbourhood should be occupied and held as long as possible.

The defence of such a post is made by infantry. It is but rarely that pieces of artillery are employed from the inside, because providing them with ammunition is dangerous, and because a retreat from such a position is generally contemplated; besides, the assailant has the advantage of simultaneously engaging the post and the artillery.

Positions for artillery in the neighbourhood of buildings are generally to be avoided.

At very important points, when long straight passages, such as dams in swampy ground, bridges, &c., which the assailant must cross, such as cannot sufficiently be defended by sharpshooters, and such as can only be enfiladed from positions at a distance, under these circumstances an exception must be made to the above rule.

When it does not appear absolutely necessary to place artillery within the post, positions on the flank are at all times to be preferred.

Positions for artillery in flank and rear of the post should be selected, so that the enemy's artillery cannot take up an offensive position on one side, such that its line of fire shall strike both the artillery of support and the post itself, but rather that its fire must be excentric; and on the other hand that the post shall be flanked by the artillery on the defence.

The pieces destined to the defence should be selected and placed according to the nature of the ground and their efficiency; covered positions should be thrown up for them, such as *flèches* or other earthworks, because it is to be anticipated that the enemy will be in superior force.

Natural cover should be turned to account for the limbers and waggons, or epaulements should be thrown up for the purpose.

Care should be taken to have a sufficient provision of canister shot and shrapnell ammunition.

These positions are only to be taken up by the artillery of the defence when the safety of the post is threatened, and its attack appears to be determined on.

The artillery should not permit itself to be inveigled into a serious cannonade at long distances, but should endeavour to engage that of the assailant in any positions within short range, and more especially to beat off the assaulting columns of infantry.

When it succeds in keeping the assailant's artillery at a distance, the maintenance of the post may be [illegible]sidered secure.

2. *The attack.*

The attack of such a post as above described—one laid out and strengthened on the principles of fortification, impregnable by a *coup de main* and supported by artillery—is made either by surprise at night or by main force in daylight, in conjunction with a superior artillery.

The artillery in the latter case has the following task to perform:—to silence the enemy's pieces, to breach the wall surrounding the post, and to protect the storming columns.

The howitzer battery of reserve should be employed against the guns of the post which are under cover, while the 12-pounder batteries engage those accessible by direct fire.

The first positions should be at a medium distance, about 1000 paces, embracing the defenders' position, and so placed that their line of fire should strike two objects.

The cannonade should be at once opened with the greatest possible superiority of force, and must be carried on, the batteries gradually advancing, until the enemy's artillery is dislodged. At the same time, the building should be shelled, if there is any hope of gaining the object in view by setting fire to it.

As soon as the enemy's fire begins to slacken, a few 12-pounder guns should be advanced, under protection of the batteries remaining in position, up to at least 600 paces from the surrounding wall in order to breach it; at the same moment, the fire of artillery, which hitherto has been concentrated on the defender's artillery should be turned against his infantry.

Great effect may be anticipated from shells thrown at a high angle at masses of troops and reserves, against the farm-yard and the keep, as well as from shrapnells fired at infantry standing in the open field.

As soon as the breach is ready, the pieces advance smartly up to between 500 and 600 paces just before the assault of the post; while the remainder of the artillery fire against the supports which may be hastening to its assistance from the rear.

SECTION 23.—USE OF ARTILLERY IN VILLAGE ENGAGEMENTS.

Villages and market towns, were carefully avoided in the line tactics of the last century, as being destructive to the order of regular troops, but are considered in those of the present day as one of the most important means of strengthening defensive positions; so that in most of the battles of later times they form the actual focus of the engagement.

Their importance, in a tactical point of view, is dependent upon their position on the ground, as well as upon their nature. When before or in the immediate front of the position, they constitute advanced posts, flank supports, or the key of the position, and when occupied, become an important element of the defence. Nor are they of less importance when they cover or command defiles.

Their position is favourable to the defence on an even plain, or still better on an even open slope falling gradually towards the enemy, affording within gun range of the enemy either commanding points or covered positions, from whence an uninterrupted view may be had. When the ground is rugged, the roads leading to them should be such as are clearly determined: further, it must be considered favourable to the defence when to the right and left good positions for artillery are available close to the spot, whose flanks are protected by impracticable ground; and when the retreat is easy, and a second defensive position is available in rear.

The nature of a village is advantageous, when its broad side is turned towards the enemy; when the main street, a stream, or a ravine runs parallel to the front through the place, forming a ready-made division for the second line of fire; when a wall surrounds the place; when its buildings are massive, and one substantial main building is available as a redoubt, which commands the streets having access to it. Churches, castles, and isolated enclosed courts form redoubts, such as can be held with a small force, and which will render the recovery of the place once lost all the easier.

1. *The defence.*

The strength of the defence of a village lies in the preparation of the place beforehand, employing artificial obstacles, and turning to account natural ones, and in the full and secure use of fire-arms; its weakness consists in the dispersion of the force, wherein each individual appears to be too little in connection with the mass, and in the danger of wasting too many troops in an obstinate defence, and of engaging the reserves prematurely.

Hence follows the rule: that the defender should never extend or scatter his troops too much; that the connection of individual wards should be assured with the whole; that the defender should support the line by partial reserves; but that, should the assailant have entered the place, he should be dislodged by the chief reserve.

The character of the defence is entirely conditional upon the place having those favourable qualifications which have been detailed, and the possibility of making an energetic resistance. Should it be thus favourably circumstanced, the defence may be conducted with great obstinacy; if otherwise, it should not be held to the last, but only until the enemy advances in superior force.

In places where it has been determined to hold out with great obstinacy, batteries of heavy artillery should be established on one or both sides, whose strength should be dependent upon the importance of the post; their object is to carry on the fight at long distances with all possible energy, and to flank the circuit of the village. This position of artillery close to the place is the soul of the defence, as the enemy can never make himself master of the place until it has been dislodged. Everything must be done for its protection that time and means admit of; the position for the pieces, previously prepared, must, however, remain unoccupied until the commencement of the attack. Should it be impossible to flank the *enceinte* from a position to one side, or should the place be of considerable extent of front, light pieces should be placed at the re-entering angles of the *enceinte*, and at the main entrances; they should not engage the enemy's artillery, but, on the contrary, should keep under cover until the advancing storming columns can be plied with canister shot at a short distance.

The defenders of the redoubt, which should be occupied by its garrison from the commencement, should be reinforced by a few light pieces when it is in an isolated situation, and when there are broad straight streets, favourable to the use of artillery, leading to it.

In case the guns of the redoubt are found to render as good service as was anticipated, they should carry on its defence to the last, and it should be decided to sacrifice them in case of necessity—a decision which, of course, must be formed subject to the importance of the post.

The chief reserve, with the greater portion of the artillery, especially horse artillery, should stand under cover in rear of the village, to prevent the enemy from taking it in rear, to operate on his flanks, to reinforce or carry off the garrison, to retake the village once lost, or to prevent the enemy from debouching from it. In the latter case, the village should be considered as a defile, and the rules above given should be brought into play.

If small towns surrounded by walls are to be defended, the rules just laid down for the defence of a village are generally of good effect, only that their *enceinte*, already safe against a *coup de main*, should be more powerfully armed with artillery; part posted in the *enceinte* itself to flank the gates, and part to enfilade the main roads, dams, and bridges leading to the town. Old towers and barbettes, which may be thrown up behind the walls, answer for positions for artillery. The limbers of the pieces so placed, having their teams ready yoked, should be kept in the immediate vicinity under cover, and due care taken to ensure a safe retreat.

2. *The attack.*

Inhabited localities, lying in front of or in the opponent's line of battle, mask a portion of the ground, and circumscribe the assailant's movements. In consequence of their position on the ground, as well as of their occupation and of the position of the reserves in rear, it is frequently necessary that they should be attacked, if the assailant would not expose himself in passing them to an annihilating fire, and to dangerous flank attacks.

This necessity is not always of such an absolute nature; for the history of war affords many instances of village engagements which had better have been left unfought, and which were undertaken from the excessive value which in general is erroneously attached to the possession of villages.

As such fights are always bloody and of long duration, the assailant has every reason to avoid them, if he believes that the object of the engagement can be otherwise obtained; and if he is of opinion, while he directs his attacks upon the troops in the vicinity and behind the village, that powerful strokes in rear and other disadvantages are not to be apprehended.

At all events, it is requisite that the assailant should be satisfied as to the necessity of a village combat before he enters on it, because it is a mistake to attack a village which is not really to be taken; for, the fight once commenced, it will be soon so obstinately engaged in on both sides that a crowd of troops, out of all proportion with the object, will take part in it which may often be missed elsewhere.

The strength of the attack lies in its moral preponderance and in the concentration of its forces; its weakness, in the smaller effect of its fire.

The consciousness of strength impels masses, in spite of loss, over all difficulties, and renders them victorious; we consequently see the attack frequently succeed: but to hold a village taken by storm is much more difficult than to take it, because the want of order and the dispersion of the forces of the victor render the recapture of the lost post by fresh and oftentimes unexpected reserves of the enemy, a matter of possibility. The assailant must, therefore, not only endeavour to attain the immediate object, but look to ensuring possession of the capture by tactical dispositions and formations; among others, those of columns of companies, which appear to hold out no inconsiderable advantages. The larger the mass which has entered the village, the more difficult it will be found to keep and restore order. The masses of troops which have followed the storming columns should more particularly direct their attention to marching on the enemy's reserves, and to securing possession.

Attacks upon villages with inferior numbers are particularly to be repudiated. The assailant should always advance at the outset with superior force: this remark especially applies to the employment of artillery.

The weak point of the attack and the smaller effect of its fire, should be compensated by a more powerful artillery, both as to calibre and number; and the assault of the village should be preceded by a satisfactory effect of fire, so as to spare the infantry as much as possible.

In the attack of defiles the rule has been laid down, to bring a portion of the reserve artillery into action at the commencement of the engagement, so as to shake the enemy in his position with a powerful concentrated fire; in the case before us, the same rule applies with full force, and the successive employment here, as in the other case, must be designated as improper. The artillery in the attack has the following task to perform: to dislodge the enemy's artillery, to destroy barricades and circuit walls, to accompany the storming columns, and to repulse the enemy's reserves.

Dislodging the artillery placed in battery by the opponent on each side of the village, is an operation upon the result of which success is entirely dependent. It should be plied with a concentrated fire, the 12-pounder batteries in front, and the light and horse artillery batteries on the flanks. A useless cannonade, expensive both in time and ammunition at a long range, should be avoided; medium round shot ranges of from 1000 to 1200 paces, should be gone up to at once, from which, again, the batteries ought to gradually advance in echellon up to closer quarters.

At the same time light foot batteries should open fire against the entrances and main streets of the village, and against the pieces installed within it. Should the artillery combat have weakened the opponent's artillery fire, and a sharp fire of light infantry have been kept up on the skirts of the village, the infantry columns of attack, which up to this period have kept under cover, should then rush forward to the storm.

This operation should, however, have been preceded by a hot fire of artillery at short distances. To this end, the light foot batteries with their men mounted, should advance at a gallop up to 500 paces from the edge of the village and drive back the enemy's sharpshooters and columns of infantry with canister shot into the interior of the place.

The fire should be continued until the advance of the infantry between the batteries masks it. These batteries should not retire, but remain unlimbered in their position, in order to carry off the troops, should the assault be unsuccessful. If it be necessary to breach the surrounding wall, it is effected by 12-pounder guns, at a distance of not more than 600 paces. The breach, which should be made at the most accessible point, must be at least 20 paces broad. Four 12-pounders are sufficient to effect it; their line of fire need not be perpendicular to the wall, but may form any angle with it from 25° downwards.

The howitzer battery, posted in a position to one side and covered by cavalry, should shell the reserves in rear of the village or the village itself, when it is to be anticipated that the enemy will be compelled by its conflagration to take to the open country; on the other hand, shells should not be fired against villages which are to be occupied by our own troops, or which are to *be passed* through, so as to avoid setting fire to it *accidentally*.

After the battle of Hanau,* Napoleon ordered the capture of that city, which is situated on the left bank of the river Kinzig. Charière's division attacked it at midnight, with the idea of carrying it at the first rush; the attempt was thwarted by the courage of the Austrian brigade, under Diemar. The French artillery hereupon, at about two o'clock in the morning, directed a hot fire of shells on the city, continuing it for several hours and compelling its garrison to abandon it, as it was on fire at several places.

Horse artillery and cavalry should be in readiness to take in rear, and fall upon any of the enemy's troops which may advance in support.

SECTION 24.—USE OF ARTILLERY IN STREET, HOUSE, AND BARRICADE FIGHTS.

Street, house, and barricade fights take place against regular troops in places taken by storm, and against insurgents in towns in a state of rebellion. The artillery upon such occasions plays a secondary but dangerous part, for it must act in a confined locality, under a close and effective fire of small arms from the opponent. Should the scene of action, however, be commanded from a height from whence the streets and squares may be plied with an effective fire, the co-operation of this Arm will be of extraordinary advantage to the assailant. The artillery should not enter the place itself until the infantry has firmly established itself in a captured position, or when the latter meets with impediments which it cannot remove. In long, straight streets the appearance of the artillery at the proper moment and its canister shot fire may prevent the erection of a barricade; ready-made barricades which are defended, may be most safely destroyed by a sufficient number of round shot and shells thrown at a low angle; open squares and places occupied by a crowd in rear of a barricade, should be shelled from howitzers at a high angle.

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* Battle between the French under Napoleon, against the allied Austrians and Bavarians under General Wrede. The former were on their retreat from Leipsic. The allies were compelled to retire, though the *French suffered* severely. 30th October, 1813.

The first care of the assailant should be to take the houses which protect the barricades, for these, and not the barricades themselves, are the principal obstacles. In the fortification and proper defence of the neighbouring and commanding houses, lies the peculiar strength of the defenders; should the houses be lost, the barricades must fall of themselves, without being directly attacked. This house-fight is carried on by the infantry, without the assistance of the artillery; they should take possession of the nearest houses and from thence advance by the yards, gardens, garrets, and party-walls from house to house: in the performance of this duty they are supported by sections of pioneers; powder bags hung on the walls should be employed to make a breach, 100 ℔s. of powder being sufficient to break through the generality of party walls. The powder should be divided into small bags, containing 25 ℔s. each, four of them may be placed in a large bag made of ticking. An incision is made in the lowest bag, and a fuze with a train of powder connected to it, is fastened into the corner of the lowest bag.

Breaches in isolated massive buildings are effected by artillery with round shot—with 12-pounders, when they are available; the corners and window-piers are the points to be aimed at.

In the defence of buildings, shells and hand-grenades are most effective.

SECTION 25.—USE OF ARTILLERY IN ENGAGEMENTS AT ENTRENCHED POSITIONS.

Field entrenchments serve either to close a defile—especially to cover bridges, as bridge-heads, and usually occur in this way separately—or to strengthen positions in front of the line of battle, as *points d'appui* or cover for the flanks, in which several entrenchments are constructed at a considerable distance to the front, in line, or one behind the other.

Entrenchments, according to their nature, are divided into open or closed works. Those open at the gorge, which are termed *flèches*, formed of simple or more or less broken lines, are not capable of the same power of resistance as the closed ones are, because they are exposed to attacks in rear; if carried, however, they can be powerfully plied on their inside with a fire from positions in rear, so that the enemy cannot firmly establish himself in them, by which means their recapture is facilitated.

Field works closed in on all sides, termed according to the nature of their trace, redoubts or starforts, are more safe in themselves as military posts, they suffer more than the others from the assailant's shell fire, and render the retreat and their recapture more difficult.

1. *Occupation and defence of field entrenchments.*

Entrenchments should be armed with artillery, not according to their construction as open or closed works, but in proportion to their size, importance, and position on the ground.

Small advance field works are usually occupied as infantry posts only, and have no guns; on the other hand, larger works, as a rule, are provided with artillery when they form the *point d'appui* of a defensive position—when they defend defiles, and are, therefore, of great tactical importance—when, again, they command determined approaches—or when the effect of their fire cannot be compensated by artillery in any other positions. But even under these circumstances the number of pieces placed in battery in entrenchments must be confined to a minimum, because the defender should be prepared to lose them, and likewise, because it is the intention that the pieces in the entrenchment should be more for the purpose of strengthening the post in itself, than for coping with the enemy's artillery in a cannonade. The regular artillery fight and the flanking of the entrenchments is conducted by artillery in position in rear, covered by earthworks, and by reserve artillery in the open field.

When it has been decided, according to existing circumstances, to arm an entrenchment with artillery, 12-pounders and howitzers are placed in the salient angle to command the ground in front; 6-pounders, on the other hand, are placed in the re-entering angles, or upon the flanks, to enfilade the ditches and approaches.

The pieces fire either *en barbette* or in embrasures; the former have the advantage of a larger field of fire, the latter of affording better cover. Barbettes are the rule, and, when it is possible, it is desirable to have more barbettes than there are pieces in the work, in order to be able to change their position according to circumstances; embrasures are the exception, and they are employed when the enemy can only approach the entrenchment in certain directions, and when causeways, dams, hollow ways, bridges, and ditches, are to be enfiladed.

For the defence of ditches of enclosed field works, such as cannot be enfiladed from the flanks or re-entering angles, live shells render good service; for this purpose little tracks should be cut in the superior slope of the breastwork, and furnished with wooden runners.

For provision of ammunition several small magazines should be constructed in the breastwork or in the traverses; they should be lined with wood or with barrels, to make them both dry and strong; in open works, on the other hand, the ammunition for the pieces should remain in their limbers, and covered ground in rear of the flank should be taken advantage of for their protection, or, when that is not available, traverses should be thrown up in the immediate neighbourhood.

Taking the limbers and waggons into the interior of the entrenchment is at all times to be avoided.

To defend the men working the guns, ditches 2 feet deep should be sunk to the right and left of the battery, perpendicular to the breastwork; bonnets made of gabions or sandbags should be added to the breastwork, and blinds should be made of balks or boards, having a small slope on the interior slope of the parapet; it is likewise advisable to have a small provision of gabions and entrenching tools at hand.

To diminish the effect of shell fire, the interior space may be dug up, in order to soften the surface of the ground, so that the enemy's shells falling on it may sink deeply.

The distance of the most remarkable points within range of the work should be ascertained, in order to ensure accuracy of practice. Obstacles should be thrown up within effective canister shot range.

The following rules obtain for the conduct of the artillery:

The disposable artillery should be divided into three parts; for the entrenchments—for the positions lying in rear of them—and for service in the open field.

The pieces destined for the entrenchments should be placed, before the action, close to their barbettes or embrasures parallel to the breastwork: the embrasures should be blinded with a few empty gabions.

The artillery which is to take up previously prepared positions should not occupy them before the action, but should remain with the bulk of the rest of the troops in covered localities; and in order to render the enemy's reconnaissances more difficult, all freshly thrown up earthwork should be covered over with brushwood.

As soon as the enemy has approached up to a distance which promises to make the fire effective, the artillery should take up its positions and open from them, as well as from the entrenchments which should have been already occupied, with round shot and shell.

The artillery of the entrenchment should keep up this fire during the advance and deployment of the enemy's forces, as long as it appears to have the advantage of the enemy's artillery; but as soon as the superiority of that of the enemy makes itself felt, it should be withdrawn from the barbettes and embrasures into the position behind the breastwork which it occupied before the fight.

The heavy artillery, however, should continue in full activity, so as to weaken that of the enemy standing in the open field, by a cannonade carried on from covered positions, and to divert their fire from the entrenchments. Should the enemy take up such positions as expose his flank imprudently, the error should be taken advantage of by the light foot and horse artillery batteries kept in reserve. The enemy's howitzer positions should be especially opposed.

As the enemy's troops approach closer, the artillery should flank the sides of the entrenchments; and when the storming columns advance, the artillery in the entrenchments should once more take up its positions on the barbettes and in the embrasures. It should ply the columns with especial vigour as they pass the obstacles in front of the entrenchments, and fire as long as possible with canister shot. If the pieces cannot enfilade the ditches, they should be withdrawn as soon as the assailant has reached the edge of the ditch and has thrown himself into it. The infantry should supply their places, close up the embrasures with gabions kept ready at hand for the purpose, and defend the parapet. If the pieces, on the other hand, flank the ditches, they should continue firing to the last moment, even at the risk of being taken.

From open works the artillery, its limbers being ready yoked, should retire into a position of reserve if the work is taken by storm: in closed works all hope of doing so must be abandoned, for the artillery of the entrenchments should share the fate of the infantry, and hold out until the affair shall have been completely decided; for the men would not work with energy if their thoughts were continually fixed upon their retreat.

In order to meet an unexpected attack at night, the entrenchments should be surrounded with a chain of posts, the artillery inside should be provided with a few light-rockets to reconnoitre the ground, and with torches to throw a light into the ditches. In default of these, wooden houses are prepared to set fire to in front and in flank of the entrenchment.

The pieces of the entrenchment should be loaded with canister shot and laid on the line of presumed approach; one half of the men remain by their pieces, while the other half rest.

An instructive example of well defended entrenchments was given by General Frère in the year 1807. He had occupied the bridge head at Spanden* on the

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* This bridge head resisted two attacks: one by the Russians under Benigsen, and the other by the Prussians in the beginning of June, 1807.

Passarge with four 12-pounder guns and a regiment of infantry, and had placed artillery in rear to defend its flanks. Attacked by 31 pieces, the defensive artillery gradually discontinued its fire, and withdrew its pieces from the embrasures. The Russian storming columns advanced with spirit, but when delayed by the abbatis which had been made in front of the entrenchment, the artillery of the work suddenly once more opened its fire at short range with such success, that it decisively repulsed the attack.

2. *The attack of field entrenchments.*

The attack may be made by surprise at night or by open force in daylight. In the former species of attack the artillery can only co-operate in the manner detailed in the article on surprises; in the latter it is the most important and most effective Arm. Its first task is to dislodge the pieces placed in battery in the entrenchment and in retired positions. For this purpose it should have a superior number of pieces, and, when possible, superior calibres, and especially numerous howitzers. To dismount the enemy's pieces, 12-pounder guns should be placed in front and opposite the line occupied, while the 6-pounders enfilade it from flank positions.

Short howitzers are the most effective species of ordnance for shelling the entrenchments and covered positions of artillery. Their high angle shell and shrapnell fire, the bursting point of which is higher than with shrapnell fired from guns, promise the best results against the enemy's troops inside the works.

Against closed works howitzers are advantageously placed on the prolongation of the capitals, but when these positions are attended with disadvantages, they should not be occupied; as howitzers are not so confined to determined points as guns, the main point to be considered is that they be in the greatest possible safety from direct fire and from sudden attacks with the steel. A close advance into effective range is especially to be recommended for the assailant's artillery. The truth of the proposition, that the fire of artillery at long ranges is useless, appears in the most striking manner when it is directed against field works, when extremely confined and small objects are to be aimed at: and therefore the first position ought not to be taken up at more than 800 paces, or at all events the artillery should soon advance up to that distance, and engage the defender's artillery with round shot, shell, and shrapnell. As soon as the object of this first position of the artillery has been attained, the way for the storm of the entrenchments must be prepared by a close canister shot fire; for which purpose light batteries should advance up to within 500 paces, while the heavy and howitzer batteries continue their fire from the positions occupied, so as to keep a check upon the defender's artillery. The storming columns should advance under the protection of this fire concentrated upon the entrenchments, and there ought to be no doubt of their success if the artillery has done its duty.

The batteries gradually cease firing, as they become masked by the advance of the infantry; they continue, however, unlimbered in their position, so as to be able to recommence their fire in case the storming party should have been repulsed, and for the purpose of bringing about a second attack.

The horse artillery remains in reserve, in order to make head against sudden flank attacks of the enemy.

If the storm of the field works is successful, it is necessary that their possession be insured: for we ought to be prepared to find that the enemy attempts to retake them with his chief reserve. The pieces captured from the enemy should be used for this purpose, or a few light pieces of the assailant's artillery should be placed in the captured work.

SECTION 26.—USE OF ARTILLERY IN THE OCCUPATION OF EXTENSIVE LOCALITIES, AND IN THE DEFENCE OF ENTRENCHED POSITIONS.

Previous unsuccessful actions or inferiority of force itself, may compel a corps to keep on the defensive. Should it be forced to accept battle under such circumstances, it should endeavour to take up a strong position, in which the natural and artificial conformation of the ground favour the defender and compensate for the superior weight of the enemy.

Taking advantage of the ground in latter days has been wrongfully neglected; this is to be attributed, on the one hand, to the greater mobility which generally speaking characterises more modern operations, and on the other, to the idea of making an active defence.

With reference to the latter point, the idea is doubtless a correct one; but it appears to be forgotten, that the fact of calling in art to one's assistance in a previously prepared position, does not render the defensive more arduous, but that, on the contrary, such a precaution is favourable to it; for the attack costs the enemy more, the offensive blows of the defender are supported by the fortified points, and the entrenchments always ensure the retreat. Since, therefore, field fortifications on the defensive are always useful and never hurtful, when scientifically laid out, they must be of substantial utility to corps beating a retreat, for as soon as it has succeeded in reaching a good position, they afford a rallying point to the pursued troops; they make a certain impression on the enemy; they reanimate the spirits of the troops; and afford an opportunity of resuming the offensive, when reinforced by troops from the rear, or when the enemy commits a fault. In the last century, the selection and fortification of strong position was looked upon with more respect than at present, and Frederick the Great declared that this was the highest class of generalship. The Great King proved how excellent a master he was in it on many occasions, especially in the entrenched camp of Bunzelwitz in 1761,* in which he made head against the quadruple numbers of his opponent. With reference to this point, the following instances of latter years have become famous:

The far famed lines of Torres-Vedras laid out by Wellington in the Peninsular War; they were in three lines, and consisted of 3 fortified towns, and 139 redoubts armed with 500 pieces of ordnance.

The entrenched position of the Russians at the battle of Borodino in 1812, and the Polish entrenchments at Warsaw in 1831.

The latter made the circuit of Warsaw, situated on the left bank of the Vistula, forming a triple girdle of more than 80 forts, a portion of which were only partially finished. The central work "Wola" was in the first line, and was connected with other important works and fortified villages, by means of lunettes and redans. In rear of the first, at a distance of 2500 paces from the wall of the town, stood the second line, including one fortified village; and behind this again was the earthen wall of the city having several advanced lunettes.

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* "The works of this camp, which only required four days in construction, were more honourable to the Prussian engineers than the sieges of Olmutz and Schweidnitz. There is no instance on record in which the advantages of ground were brought to better account by art and *coup d'œil* than this one, nor in which the trace and all the details were better adapted to the force and constitution of the army."—"Art et Histoire militaires—Rocquancourt." It is shrewdly suspected that the Russians were not very much in earnest in their attacks on it from political motives.

The determination of the points upon which entrenched positions are to be thrown up, appertains to the science of strategy. Tactics have to see to the fulfilment of the following conditions:

1. The front should be strengthened by obstacles of ground, fortified villages, single forts, and artillery positions, so as to enhance the difficulty of approach, and to compel the enemy to divide his force.

2. The flanks should be protected by impracticable ground or by forts.

3. The change to the offensive ought at all times to be easy, and should be favoured by the ground or by dispositions of fortifications made for the purpose.

4. The line of retreat should not lie through defiles or difficulties of ground.

The selection of the positions to be fortified should be made with the most solicitous attention to their extent with reference to the disposable force; for we are only too easily seduced into occupying ground divided off by nature, and thus into dispersing the force over too great an extent. When it is in contemplation to fight a defensive action, such an extended disposition would be the greatest foible of a position; because it disperses the available force, and leaves no sufficient body of troops in the hands of the commander to deal a powerful blow. If the defence is to be obstinate, more than a quarter of a mile* of frontage for a division of 12 battalions,† or more than half a mile for an army-corps ‡ should not be occupied. These generally adopted rules are, nevertheless, not unfrequently departed from.

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* 2009 yards. † 12,000 men. ‡ 30,000 men.

At Idstedt,* the front of the position stretched in a salient curve over an extent of two miles † of ground for 26,000 men.

A good position can only be fully done justice to, by giving it a suitable armament of artillery, by which means a certain preponderance can be given to the defender at the commencement of an action.

The artillery has the following task to perform:

1. To support the advanced troops by defending the ground in their front.

2. To occupy such fortifications as may be deemed judicious, and positions to the flank and rear, so as to give a flanking defence to the forts.

3. To form powerful batteries in commanding and advantageously situated situations as the main points of support to the defence.

4. To form a reserve that shall be easily moveable.

The defence of the ground to the front should be made over to an advanced guard composed of all Arms, especially of cavalry and horse-artillery, which should occupy ground, and defiles lying beyond the range of artillery in front of the position, such as are capable of an easy defence; by this means the approach of the enemy's advanced troops is rendered difficult, and he is compelled to make an early development of his force. As soon as this object is gained, and the enemy attacks in superior numbers, an orderly retreat should be made on the main position. The artillery should, generally speaking, observe the rules laid down for the conduct of the Arm in advance guards and post engagements; it should particularly avoid exposing itself, and should merely endeavour to support the combat, and the eventual retreat of the other troops.

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* Battle between the Danes and Schleswig-Holsteiners, the latter being victorious. This action is remarkable from the fact of cylindro-conical bullets, fired from pillar-breeched rifles, being for the first time used, and most successfully, by the Schleswig-Holsteiners. 25th July, 1850.

† 9.3 English miles.

This combat, carried on by the outlying advance guard, forms the opening of the engagement; it should be prudently supported as it is requisite to avoid having too many troops drawn out from the position, so as not to be engaged upon ground upon which there is no intention of seriously fighting. The *corps de bataille* should remain under cover of the main position, and gradually withdraw the light troops which are in the advance, when it should itself engage in the combat.

The combat, at the commencement of the main affair, will be one of artillery, as the defender from the nature of the case must reckon on a vastly superior force against him; he should consequently endeavour to fight with his artillery at long distances, so as to weaken the enemy and retard the crisis as long as possible.

The occupation of the field works with artillery should be effected with the greatest economy. The dispersion of the force is to be avoided; as it is not intended to defend everything, but to establish batteries upon the principal points which form the peculiar strength of the position.

These batteries, which should command the field of battle, ought to be placed at the most advantageous points; they should be advanced somewhat in front of the line of infantry and cavalry, and be covered by earthwork or cuttings.*

Positions on a height are advantageous for this purpose; they should command the level plain from the height of the plateau, and should not be masked either to the right or left, so that they may deliver their fire in every direction.

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* *Vide* page 53.

The battery of 18 pieces, which covered the centre of the Russian army at the battle of Borodino,* was established upon a round knoll commanding the ground in every direction, and invested the position with such strength, that it sufficed to render ineffectual the warmest attacks which the French made from their left wing. This battery formed a pivot upon which the Russian right wing, after having been twice broken, resumed its original position. The oft repeated but undaunted attacks left this battery eventually in the power of the French, not until, however, they had lost their *corps d'élite* and the Generals Montbrun and Caulincourt. Its capture decided the retreat of the Russian right wing.

The heavy batteries of the reserve and the howitzer batteries should be used to occupy the fortifications, as well as to form large batteries. The light batteries should remain with the troops so as to co-operate with them in the main position.

The formation of a moveable reserve is effected by uniting the unemployed pieces of the artillery of reserve with the horse artillery batteries; it should be placed under cover behind the centre or upon the flank of the main position.

When in conjunction with other available troops, it forms an ever ready means of supporting the combat by offensive sallies and energetic offensive strokes upon the enemy's flanks and other weak points: herein lies the true soul of a well-conducted defence.

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* Battle between the French and Russians, former victorious. 7th September, 1812. *Vide* note, page 178.

CHAPTER V.

USE OF THE ARTILLERY OF AN ARMY-CORPS IN A GENERAL ACTION.

SECTION 27.—PRINCIPLES OF THE EMPLOYMENT OF THE DIFFERENT BATTERIES.

1. *Light foot batteries.*

THE fact of the light foot batteries being attached to divisions of infantry at once indicates the chief part they have to perform. Thus permanently allied, they serve on advance and rear-guards, and support the combat of their divisions, always in combination with infantry.

2. *Heavy foot batteries.*

These batteries are rarely as intimately attached to infantry as the light batteries, their movements are slower, their sphere of action more extended, and they can be employed with more deliberation; we may calculate, then, upon their occupying a given position for a longer period of time, and, consequently, may more carefully consider the means for their protection.

From the nature of the reserve artillery, it should effect the following objects:

1. Support the artillery of division in combat, by detaching single batteries from the reserve.
2. Defend and attack in defile actions, in the passage of rivers, in local engagements and entrenched positions, with the especial task of engaging the enemy's artillery therein.
3. Form masses of artillery for the decisive struggle of an action, both in an offensive and defensive sense.

3. *Howitzer batteries.*

They are distributed in the same manner as the 12-pounder batteries of reserve, and are analogously employed in action. As, then, the same objects in an engagement are allotted to them, it is only necessary to add, that they should be used in every case where an enemy is protected by natural or artificial means from the direct fire of guns.

The great moral effect of the fire of hollow projectiles, moreover, renders them peculiarly applicable for effectually shelling large masses of infantry or cavalry in the open field; and their capability for setting wood, &c., on fire imparts to them an especial value where buildings are to be burnt: but in making use of them it should always be remembered that a satisfactory effect of howitzer shells is only to be produced by concentrating the fire of as great a number of pieces as possible.

4. *Horse artillery batteries.*

They have the same capacity of locomotion as cavalry, and, in conjunction with that Arm, form the most decisive offensive element of an army; they are peculiarly qualified, therefore, to act with cavalry, and to form a moveable reserve. As they are composed of pieces of the same calibre as the light foot artillery, and as they suffer greater losses in action than the latter, they should not be made use of to arm entrenched positions, or, more particularly, to engage the enemy's artillery; on the contrary, they should be only employed to take the enemy unawares by an effective fire at close quarters, without permitting themselves to be drawn into a long cannonade, as the combat of this kind of battery ought to be characterised by activity, velocity, and sudden appearance within effective range.

The duties it has to perform in action are as follows:

1. To reinforce the advance or rear-guard when they consist principally of cavalry.
2. To be permanently attached to the cavalry divisions in the character of artillery of division.
3. To support the line of battle, when it is impossible for foot artillery to do so, when the distance is great, and when it must be traversed quickly, and when it is necessary to establish fresh batteries at very important points for the purpose of meeting unexpected attacks, and of executing sudden offensive manœuvres.
4. To form large masses of artillery with the reserve artillery.

The combination of horse artillery with infantry is merely exceptional: if the circumstances of an engagement render it compulsory, it should assume the part of foot artillery, without, at the same time, giving up its peculiar capability for manœuvre, in so far as it may be of use in attaining the object sought for in the combat.

SECTION 28.—THE ARTILLERY OF DIVISION IN AN ENGAGEMENT.

1. *With an infantry division.*

The artillery of division, which usually consists of two 6-pounder foot batteries for a division of 12 battalions, should augment the fire of the infantry in a tactical point of view, and increase the power of attack and defence of that Arm. It should form an integral portion of the line of battle, and fight with the infantry from the beginning of the engagement to its close. The better the infantry, the more advantageous will this combination be. In order to render the connection more intimate, the batteries should be permanently attached to divisions, so as to promote good-fellowship among the troops, and the General in command will thus have an opportunity of knowing the military qualifications of his battery commanders; while the latter may endeavour to grasp and to act agreeably to the views of the former as to the manner of using their particular Arm.

The golden rule which the commander of a battery should ever have before him is this: that divisional artillery, like divisional cavalry, is merely an auxiliary Arm; and that the infantry, and not the artillery, is the chief element in an action. It is therefore the duty of that artillery to comprehend the object momentarily in view, with quickness and accuracy, and powerfully to support the infantry in combat.

All enterprises beyond this range should be left to the reserve artillery.

(a.) *On the offensive.*

The order of march is laid down by superior authority. When on the march in the vicinity of an enemy, the batteries should be between the brigades and not in rear of them—a position from which there might be some difficulty in advancing sharply to the front, and which might entail a disadvantageous loss of time. Each battery should march with its pieces and waggons in close column, up to the moment when it forms and prepares for action.*

The advance into action should be executed according to the rules above laid down, and to the principles previously detailed, having reference to position, pace, and conduct in action, and these only should be brought to bear.

The separation of the batteries in an action into half batteries and divisions, is seldom useful on the offensive when the whole division is present, and it is frequently injurious; this should, therefore, be avoided as much as possible, and only be ordered when the necessity for it appears; to act otherwise would be to disperse the artillery from the outset.

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* *Vide* page 42 for the "normal formation for action."

The reverse of the above case, namely, the union of two batteries of division at one point for the common object, is necessary when an individual point of an enemy's position is to be attacked in superior force.

Detaching the divisions of howitzers is advisable, when the nature of the ground demands it; and batteries composed peculiarly of howitzers may be formed by uniting several howitzer divisions.

A 12-pounder battery is indispensable to each division, and should be disposed of according to circumstances; if it, however, does not possess one, each division should itself form a small reserve of artillery, by the retention of a few of its pieces.

When the division advances against the enemy, the artillery should open its fire, when the ground is clear, upon that of the enemy at effective range; and as it will have the advantage of the infantry as to pace, it must only precede the latter at such a distance as shall be compatible with effect of fire and its own safety.

In ground where there is a good deal of cover, on the other hand, the artillery should not advance too soon, but wait until the sphere of action is clearly developed, and then take up its position close to the infantry, so as not to expose itself to a surprise.

On a closer approach to the enemy, the artillery should endeavour to draw off the fire of the opponent's artillery from the infantry by a close round shot fire, and at the same time endeavour to weaken it; and when this is effected, to shake his infantry by round shot and shrapnell fire.

The succeeding attack in mass should be preceded by a close and decisive canister shot fire, and for this pupose a portion of the pieces should advance even up to musketry range, while the remainder continue the fire against the defender's artillery, or advance and attack it with canister shot.

The pieces in advance should await the issue of the bayonet attack in position unlimbered, so that in case of miscarriage it may carry off the beaten troops and check the pursuit, as well as prepare the way for a second attack. If, on the other hand, the attack is successful, the batteries should limber up, march up to the line of the infantry, and open fire against the enemy's reserves. If the artillery advances too soon, it may seriously compromise the whole attack.

If the infantry which is to be attacked has no artillery with it, the round shot fire of the assailing artillery should be opened against it at a closer range; thus, less time will be expended in coming up to canister shot distance and to the attack with the bayonet.

The continued support of the artillery in the combat, as above described, has likewise an effect on the moral tone of the troops, as they will attack with much more confidence when they feel that their flanks are protected by artillery.

It has already been stated, that the artillery should generally move and take up positions on the flanks of the infantry, and that it should regulate its distance so as not to be in the way of their manœuvres nor to place itself in jeopardy; the latter point should be particularly attended to when the ground affords cover; for batteries have not unfrequently suffered greatly from unexpected attacks, when their connection with the mass of the troops has been broken. A case in point is that of Baggesen's battery, at the battle of

Idstedt,* which was attacked by the brigade under Horst in the covered ground near Oberstolck.

When a division or a wing in an action has to change front by throwing a shoulder forward, it is of importance to establish a battery in front of the pivot, so as to protect the movement of the troops and the execution of the manœuvre; and for this purpose it will be found advantageous to make use of a heavy battery of the artillery of reserve; the light foot or horse artillery pieces should follow the wheeling flank as a reserve, to enable them to oppose a flank attack of the enemy at once, or to take up a position on the outer flank when the change of front is completed.

(b.) *On the defensive.*

On the defensive it is of the greatest consequence that the artillery should select its positions with care, and fortify them scientifically, for by this means the superior force of the enemy may be partly counterbalanced. The formation of an artillery reserve is still more necessary on the defensive than on the offensive, and it should exist in every case; as, however, a division when engaged in a defensive action on a large scale must necessarily develope the whole of its strength, and, indeed, must generally be reinforced by batteries of reserve artillery, it will, consequently, likewise fall to the lot of the latter to form the reserve, so that the divisional batteries may be in full strength with their divisions.

Separating batteries into half batteries and divisions cannot always be avoided on the defensive, where the ground to be defended is rugged; it must, however, be confined to cases of necessity.

* *Vide* page 143.

We may here remark that the necessary dispositions have already been laid down for the conduct of the artillery occupying a position in which the divisional batteries may be employed, in the following cases, viz., when placed in farms, villages, forts, retired positions, in large batteries, or similar points which it is requisite to hold vigorously.

Excepting the above cases, the divisional artillery in a defensive combat should act as follows:

Separate itself still less from the infantry than when on the offensive, as the danger of a surprise is much greater.

Open fire upon the enemy's columns as they advance, when they come within range, and ply his artillery with great vivacity when limbering or unlimbering; by no means permit itself to be drawn into a serious cannonade with the assailant's artillery (this duty is to be performed by the heavy batteries of the reserve artillery advanced in support), as by that means it would sacrifice the strength which ought peculiarly to be employed in supporting the infantry in action.

The strictures of Frederick on one of the great faults of artillery, namely, firing principally upon the enemy's artillery to silence it, apply in the case before us. It was the King's order that the whole of the fire should be directed against the enemy's line of infantry, so as to throw it into confusion, to check its movement, and to hinder it from manœuvring in good order. This object once gained, the infantry are soon beaten and as to the artillery, they will cease firing of themselves.

If the enemy's artillery fire is much superior, an effort should be made to divert it by dispatching a few light pieces to appear suddenly on his flank; this is usually a more effectual method than reinforcing the front.

Just as it behoves the artillery to fire sparingly upon the enemy's pieces, so in the inverse ratio it should develope the whole of its strength against the columns of attack when they advance against the position. When requisite, indeed, it should cease altogether to reply to his artillery, so as to repulse the storm with shrapnell and canister shot fire.

It is a judicious arrangement, to make the little reserve of artillery advance suddenly in close order upon the flanks of the storming columns, to prepare the way for an attack by the cavalry, which should immediately succeed the canister shot fire.

Should the enemy's troops still advance in spite of the lively fire on their front, and of the eventual surprise in flank, it is the duty of the artillery to continue its fire until the enemy actually reaches the muzzles of the pieces; for under no circumstances should it retire as long as the infantry stands fast, as it would be the greatest dereliction of duty to abandon them.

Should batteries be captured by the enemy, in the performance of their duty while firing, protecting the infantry and holding out to the last, they will be honourably lost.

But there is no great fear of their loss, if only their flanks be protected; and Gassendi says with justice:

"*Les derniers coups sont les plus décisifs, ils feront votre salut peut-être, mais votre gloire sûrement.*" *

How true this is, military history demonstrates over and over again.

At the battle near Paris,† the 6-pounder battery, No. 4 (Lehmann's) was suddenly attacked by a regiment of Polish lancers, which continued advancing in spite of the most vigorous fire; they were compelled to wheel about, however, having reached up to within 20 paces of the muzzles of the guns, and suffered immense loss.

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* The last rounds are the most decisive; they may be your salvation *but they will certainly* be to your glory.

† *Battle between* French and Prussians, put an end to by an armistice. *2nd July, 1815.*

At the battle of Bautzen,[*] 8 battalions of Wurtemburghers advanced on the village of Kreckwitz, occupied by the Prussians. The fire of the whole of the Prussian pieces in position on the right of the village was directed on the advancing columns; they avoided this fire, however, by cleverly taking advantage of the ground, when General von York advanced No. 1 horse-artillery battery (Zinken's), at a gallop towards the line of the valley on the right flank of the Wurtemburghers. Upon which General von Franquemont charged it with a battalion of infantry, but the latter was thrown into the most complete confusion by the canister shot fire, and was afterwards compelled to lay down its arms at Kreckwitz.

The great effect of canister shot fire of even single pieces on attacking troops was demonstrated at Gross Görschen,[†] where a single piece, of No. 8—6-pounder foot battery, which had been upset, and had to be righted before it could follow the battery, was attacked by the French hussars. The non-commissioned officer in charge put a canister shot over the round shot already in the piece, and fired so as to disperse the hussars who had come up quite close to the gun. Nor did an infantry column fare better, which advanced upon it at the same moment, looking upon the piece, which was almost abandoned, as an easy prize.

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[*] Battle between the French under Napoleon, and the allied Russians and Prussians under their respective sovereigns. The 4th corps of the French army under Bertrand was compossd mostly of Germans, who in the text are called "Wurtemburghers." The French were victorious. 20th and 21st May, 1813.

[†] This battle is termed by English and French historians, that of "Lützen," fought between the French and the allied Russians and Prussians—both parties passed the night on the field of battle. On the following morning the Allies retreated, in consequence of the want of artillery ammunition. 2nd May, 1813.

At Quatre-bras, two British pieces posted in front of the farm protected by some infantry, permitted the French cuirassiers attacking them to come close up, before firing canister shot; their fire, combined with that of the infantry, was under these circumstances so deadly that it forced the whole column to wheel about; only four horses, carrying their dead and wounded riders, got between the pieces.

La belle Alliance* demonstrated that artillery persevering steadily in keeping up the fire has the best moral influence upon the behaviour of the infantry. The British artillery did not limber up on the repeated attacks of the French cavalry, but delivered its fire at the shortest distances; whereupon the men retired to the infantry squares, and after the failure of the attack upon the squares, they hastened to their pieces to follow up the cavalry with their fire.

Examples, on the other hand, where an opposite line of conduct was adopted, prove that the retreat of the artillery has the most injurious influence on the infantry, who in such cases consider their main support gone.

Artillery should only retreat with the infantry, unless there are superior and express orders to the contrary. It should use the prolonge when the ground is even, and if the infantry retreats by alternate brigades or regiments,† it should always remain with the rear body.

Single batteries should retreat by half batteries, so *that the fire* may be uninterrupted; and when there are several batteries distributed along the line, by alternate batteries. In all cases, the portion in action should not retreat until that in rear has opened fire.

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* Waterloo.

† "En echiquier."

When several batteries formed into line in one great battery are to retreat by batteries, it should be by echelons and not *en echiquier;* as in this method the rear portion has greater freedom of fire.

Positions in rear, which must be provided with artillery, are best armed by reserve batteries, as this does not weaken the line of battle nor deprive the infantry of its artillery; should, however, the divisional batteries receive an order from superior authority to occupy such positions—as for example in front of the infantry in retreating through a defile—the foot artillery should send its spare numbers to the rear in due time or attach them to the nearest infantry, as by this means, with its men mounted, it can get the requisite start of the infantry; it should then take up a position in rear and in flank of the defile, so situated that the line of retreat be left open for the troops, and the defile itself be enfiladed.

When the enemy's cavalry is observed to be about to attack an infantry position, the batteries should close in to the masses in flank when there is sufficient time to do so; or, still better, they should place themselves in rear of the interval between two masses, time and space permitting: should the assailant's cavalry, however, be actually advancing, the artillery should waste no time in moving, but open fire from where it stands; it should be careful to mask the infantry fire as little as possible. If the battery is attacked in flank, the pieces on that flank should wheel back, so as to take the enemy by direct fire.

2. *With a cavalry division.*

Horse artillery, when attached to large masses of cavalry, forms that element of the body whose peculiar office it is to fire, and endows such masses with the requisite power of attack and defence for undertaking independent tactical operations. Napoleon says, with reference to the necessity and object of this combination,

"*L'artillerie est plus nécessaire à la cavalerie qu'à l'infanterie, puisque la cavalerie ne rend pas de feux, et ne peut se battre qu'à l'arme blanche. C'est pour subvenir à ce besoin qu'on a créé l'artillerie à cheval. La cavalerie doit donc toujours avoir avec elle ses batteries, soit qu'elle attaque, soit qu'elle reste en position, soit qu'elle se rallie.*" *

A cavalry division † composed of from 4 to 6 regiments in two brigades, should have a battery of horse-artillery permanently attached to it. This detachment of artillery may be increased, when the division is to be employed on independent service, up to from 2 to 3 batteries.

Two divisions, having from 2 to 4 horse artillery batteries attached, form a corps of cavalry.

The relative position of a horse artillery battery attached to a division is generally conformable to that of the division itself, according as it is on advance-guard, with the main body, or in reserve. The separation of horse-artillery batteries attached to cavalry into half batteries and divisions, should be more studiously avoided than with foot artillery attached to infantry; for though in defensive positions of infantry in many cases it is not to be avoided, still the cavalry much more rarely finds itself compelled to remain on the defensive; moreover, keeping them together is unquestionably to be preferred in making powerfully offensive blows at the enemy (peculiarly the specialty of cavalry), to a system which organises their dispersion from the outset.

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* "Artillery is more necessary to cavalry than to infantry, as cavalry cannot reply to fire, and can only fight with the steel. It was for the purpose of satisfying this want that horse artillery was created. Cavalry, should, then, always have its batteries with it, whether it attacks, remains in position, or rallies."

† According as there are four or six regiments in the division, it will be 2800 or 4200 sabres strong.

Should this principle militate with the apparently necessary distribution in any individual case, the latter should be modified without abandoning the former; for it is not necessary that cavalry should have artillery attached to it under all circumstances, but it is absolutely so, that the latter should be united, wherever it may appear, so as to ensure important results.

If a division has only one battery, it should be attached integrally to the main body; if there are two present, the second should go to the reserve; and when a third is available, in that case, and in no other, it should reinforce the advance-guard.

On the march in the vicinity of an enemy, each battery should follow the detachment with which it is connected, having its waggons with it in close column, until it prepares for action and assumes the normal formation for action.*

With the advance guard the battery should follow the main body of that detachment; with the main body of the division, the first regiment; with the reserve, it should be in rear.

The employment of horse artillery in supporting cavalry in action is chiefly dependent, as to method, upon what Arm of the enemy it has to deal with; it will, therefore, be well to consider its conduct against cavalry and against infantry separately.

Before, however, passing on to this subject, it appears to be our duty to enquire what Frederick the Great, who first created horse artillery, demanded of this Arm. The Instruction of the 3rd of May, 1768, indicates this in the most distinct manner. It states:

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* *Vide* page 42.

"The light mounted artillery must not appear on all occasions indifferently. The principal occasion in which the greatest effect may be anticipated of it, is when it is placed on the flank of the cavalry on a plain, from whence it can cannonade the enemy's cavalry, before our own cavalry attacks. As soon as our cavalry does attack, this artillery should immediately limber up; if the affair is successful, it should follow and be used against the enemy's infantry, and, again, when the enemy is compelled to retreat, it will be of great utility, and do good service in the pursuit.

"In *affaires des postes* these batteries, composed of light guns, may be likewise used with infantry, until heavy guns arrive from the army; moreover, they may be used while the army is on the march, and when it is desirable to occupy a main post in presence of the enemy, and some thousand of dragoons are sent to form a picket.

"A few light guns might be attached to such a detachment, for in that case the dragoons act on foot, and quite as well as if they had been some thousand infantry; light guns should otherwise never be attached to detachments of cavalry, because, under such circumstances, they would be improperly used, and nothing decisive would come of them."

We are here referred to the fountain head for the design of the creation of horse-artillery, and have before us the most competent judgment of the great master in the art of war. The principles adopted in the above instruction will remain unchanged to all time, and we ought only to make one single exception, namely, that in "affaires des postes" at the present day, horse artillery is no longer attached to infantry, but is replaced by light foot artillery; this portion of the definition of the use of horse artillery may, therefore, be considered obsolete.

(a) *General principles of the use of horse artillery in action, when combined with cavalry.*

1. Cavalry should remain in column before being brought into action offensively, as long as it is not itself attacked or exposed to the fire of the enemy's artillery.
2. The artillery should always be ready to support the cavalry in every task which the latter cannot perform unaided; the cavalry, on the other hand, in all cases where it is possible to surprise the enemy, should not permit itself to be delayed for even a second, to await the effect of the artillery fire.
3. The artillery should be protected, either by the nature of the ground or by detachments of cavalry; it should take up its position where it can produce the greatest and longest effect; on the other hand, the cavalry should avoid masking its fire as much as possible, both in advancing and retreating.
4. If artillery is used to prepare great results, it should be numerous. Obstinate struggles should be made by a persevering fire of artillery.
5. In the presence of an enemy defiles should be passed under the protection of artillery. In such an operation we should not hesitate about the loss of some pieces, provided that they are not permitted to be taken without having been previously stoutly served.
6. A powerful fire of artillery greatly facilitates an

attack against infantry; nor should this effect be renounced in consequence of its exposing the artillery to a surprise.

7. When artillery cannot be attacked by surprise, the artillery of the assailant should endeavour to weaken the fire of that of its adversary.
8. The retreat of cavalry should be covered by artillery retiring in echellon.

(b) *Conduct of horse artillery in an action of cavalry against cavalry.*

Ground to be suitable to a cavalry engagement should be firm and even, not rugged or abounding in cover, affording a breadth of from 900 to 1000 paces for the attack. These requisites are likewise favourable to the participation of horse artillery in this kind of engagement, as well as to the effect of its fire.

It is far from necessary under all circumstances to make use of horse artillery in an action of cavalry against cavalry; on the contrary, it should not be employed where it can be dispensed with; for a too frequent use of this Arm with cavalry very easily engenders the belief in the latter Arm that it requires such aid before and after every attack—an opinion which is quite erroneous, and may contribute to weaken the self-confidence and energy of cavalry.

An active well-led cavalry, having a good knowledge of *à propos*, should consider it as a point of honour to attack an enemy when disordered either physically or morally, shaken, retreating, or isolated, without the assault being preceded by an artillery fire; and similarly, when the assailant can effect a surprise, and without reference to the strength of an opponent, it is equally *incumbent on him* to attack the head or a flank of a *defiling column* of an enemy when unprepared, or who has been guilty of faults or imprudence. A cavalry commander who, under such circumstances, would permit the fire of the artillery to precede his attack, would let the favourable moment escape him, and would not act up to the spirit of his Arm. It is the leader's *coup d'œil* and tact which must decide as to taking advantage of such moments; these military qualities, however, will be all the less called upon to play a part in an engagement as the masses opposed to each other are greater.

On the other hand, the opening and support of a cavalry engagement should be executed by horse artillery under the following circumstances:

1. When the enemy has advanced artillery, so as to cannonade the cavalry column as it deploys, and to render the attack more difficult.
2. When the cavalry have to pass a defile before being able to attack, and are compelled to march out beyond it to get sufficient width of ground for the purpose; in this operation they should be protected against a sudden surprise by the enemy.
3. When the enemy is in superior force.
4. When the cavalry takes up a defensive position in the line of battle, which it is necessary to protect against the attack of an enemy in superior force, and especially when it is requisite to protract the action.

In an action under these circumstances the horse artillery, like the foot artillery with infantry divisions, should bear the character of an auxiliary Arm, only that the connection should not be of so close a nature, not to confine the cavalry as to freedom of movement, and still not to endanger the safety of the artillery. *The proper* reciprocity of action between the Arms, consists in the artillery's endeavouring to adapt its movements and positions to those of the cavalry, and in the cavalry, on the other hand, having a like regard for the horse artillery; this is necessary that the Arms may act in harmony with each other. To this may be added, that the cavalry should wait for the effect of the fire of the artillery, and that the latter should warn the former, when possible, of an intended attack, and still more, of retrograde movements, for which purpose the artillery should adopt the requisite measures.

The combat of horse artillery is distinguished from that of foot artillery by longer and quicker movements, conformably to the character of a cavalry action, and by shorter but equally energetic fire; these stand in direct contrast to the slower movement over short distances, the continual connection with the infantry, and a fire as uninterrupted as possible.

That horse artillery, in its looser combination with cavalry, should be protected against surprises, it should be provided with an escort, in every case where the brigade or body to which it is attached does not itself afford the requisite security, and that it be likewise enabled to seek support from the second brigade.

In regular cavalry engagements it is to be assumed, that the cavalry is formed into two or more bodies, as attacks made without reserving a second body are thoroughly improper, being accompanied with dangers known to every cavalry soldier, besides leaving the artillery *en l'air*.

Should, however, the cavalry advance to attack without a second body in rear, the artillery may go so far as to open the combat, but not to shake the enemy's troops preparatory to a charge; on the contrary, when this is *about to be* made, the artillery should close in to the *infantry.*

The duties of the divisional artillery in a cavalry engagement are as follows:

1. It should open the action with the advance-guard.
2. Engage the enemy's artillery.
3. Protect the movements, evolutions, and flanks of the cavalry with its fire.
4. Prepare the way for attacks on the enemy's cavalry, and protect the issue from being disturbed by the enemy's reserve.
5. Carry off the cavalry in case it should be driven back, and check the enemy's pursuit by its fire.

The conduct of horse artillery in these various cases should be as follows:

1. *Opening an engagement with the advance-guard, and conduct of horse artillery in the operation.*

Every action in which large masses of cavalry are engaged, should be opened by an advance-guard, so as to be able to reconnoitre the strength and intention of the enemy, as well as the nature of the ground, and to give time to the main body to draw itself up in fighting order.

If the advance-guard is provided with horse artillery, the latter should follow in rear of the centre of the main body of the former, until the commander of the advance-guard otherwise disposes of it. Should the battery be ordered to fire upon the enemy's cavalry or artillery, it should advance up to the line of the squadrons in skirmishing order in front of the centre of the advanced guard, as this position is a more secure one for the battery than on the flank, in consequence of the length of the line of skirmishers and of the weakness of its flanks.

The design of the artillery of the advance guard should not be to engage in a wearisome combat with the enemy's artillery, or to prepare the way for the engagement of the cavalry by a hazardous advance; its object should be more of a defensive nature, as it is intended to give the main body of the advance guard greater solidity and power of resistance against enterprises of the enemy. If the advance guard is to attack the enemy, it should recall its skirmishers, which will likewise be the signal for the battery to limber up and retreat on the main body of the division, or to close in the reserve, according as it may be ordered.

2. *Engaging the enemy's artillery and diversion of its fire from the cavalry.*

It is true that horse artillery is not calculated for cannonades, but it should, nevertheless, endeavour to engage in an artillery combat when the enemy's pieces annoy the cavalry with their fire, and when they command the ground over which the cavalry must advance. Such cases generally occur at the opening of an action, when the main body deploys from column of march or passes a defile.

With regard, to opening the action, to the advance, and to the conduct of the battery waggons, section 9 should be referred to. When in position, effect of fire, protection against the fire of the enemy, and the situation of its own cavalry should be taken into consideration. It now only remains for us emphatically to remark, that in the character of horse artillery, it should avoid, even more than foot artillery, engaging in action at long distances; for such distances are opposed to the fundamental object and the whole nature of a cavalry combat.

Effective round shot range, not over 1200 paces, *may, therefore,* be designated as the furthest limit of its first position. A clever use of the ground, oblique positions, flank manœuvres, and an approach up to 1000 paces, are the means by which it should accomplish the task of diverting the fire of the enemy's artillery from the cavalry; but its own fire must be calmly delivered, observing the rules already given for the various natures of shot and shell fire and their employment in action.

The batteries of reserve should be brought up against an enemy in superior force.

3. *Protection of the movements, evolutions, and flanks of cavalry by the fire of artillery.*

Large masses of cavalry take a certain time to deploy, and it is not always possible to perform that manœuvre beyond the scope of attack of the enemy's cavalry, especially when defiles must be passed before its execution; in like manner flank marches, and changes of front, in presence of an enemy's cavalry prepared for action, cannot always be avoided; it forms a part, therefore, of the duty of horse artillery to protect the cavalry in those weak moments by its fire. In this behoof, it should take up such a position on the flanks of the cavalry, that the enemy's cavalry cannot make an attack without being powerfully assailed by it.

If the deployment of a column is to be protected, the battery should place itself in front of the flank upon which the deployment is to be made; thus with a column right in front, upon the right, and with a column left in front upon the left.

If the artillery has to cover changes of front or wheels, it should be placed upon the inner flank of the cavalry, or pivot; as in this position it can longest continue firing.

The interval between the artillery and the flank of the cavalry in all positions must be sufficiently great to give the cavalry sufficient play for its movements, without constraint to either Arm; for this purpose an inverval of from 100 to 150 paces is requisite.

Whether the front of the battery be parallel to the front of the cavalry, or form an angle with it, depends upon the situation of the enemy; if the enemy's line to be fired at is of great extent, an angular position is advantageous to the effect of the fire, provided that the battery does not imprudently expose its own flank to the enemy.

In all cases when the brigade, to which the battery is attached, is not in a position to defend the battery instantaneously, the commander of the brigade should tell off a squadron for its especial protection, which should take up a position on its outer flank.

4. *Preparing for the attack of the main body upon the enemy's cavalry, and protecting the issue against any undertaking on the part of the enemy's reserve.*

That a fire of artillery should precede an attack, as already stated, is neither necessary in every case nor always possible; should, however, the ground and other circumstances be favourable to the appearance of horse artillery before the attack, and should its fire be so combined with the charge of the cavalry, that a preconcerted, and not an accidental dovetailing, so to speak, of both Arms take place, we may in this manner attain the greatest surety of success in a combat of a weak against a strong body of cavalry. To decide whether a preparative fire of artillery should precede the attack or not is in all cases incumbent on the commander of the cavalry, so that the command of the whole body may be uniform in idea; he, consequently, disposes of the battery at his discretion.

If a brigade is to attack the enemy without first employing its battery, the latter should retire to the second brigade and there take up a position. If, on the other hand, the attack is to be preceded by artillery fire, it should act as follows :—

The battery ordered to prepare the way for a charge, will, in all probability, have already been engaged and be in position against the enemy's artillery at medium round shot range of between 1000 and 1200 paces. It should now direct the whole power of the battery against the enemy's cavalry, and not reply to the fire of his artillery.

Artillery, in other positions, should draw off the enemy's fire of artillery; the battery, which is preparing the way for the attack, should in no case take notice of it.

The artillery should advance on the flank of the cavalry about to attack, either upon that where it is already posted, or upon that on which the greatest resistance is to be expected; it should advance with great velocity, but with foresight, up to such a distance as will ensure a good effect of fire, without, however, putting the battery in jeopardy.

It is neither necessary, nor, under the usual circumstances when unprotected by ground, permissible to open the way for an attack with canister shot fire, to do which the battery would have to advance up to such a distance from the enemy's cavalry, as would inevitably expose it; on the contrary, in preparing the way for a charge it is amply sufficient to take up a position within 800 paces of the enemy, as the effect of a battery at this distance firing round shot, shell, and shrapnell is so great, that no cavalry can stand it for any length of time, without quitting the field or ad*vancing itself* to the attack.

Supposing, for example, the chief masses of the cavalry of both sides to be at a distance of 1400 paces from each other, and that the battery is already advanced a few hundred paces, and consequently stands, say, at 1200 paces from the enemy, for the purpose of opening the action and engaging the enemy's artillery with round shot fire. It should limber up to advance and go to the front at best speed some 400 paces, and open fire at 800 paces. The main body should follow at a trot, and await the effect at a convenient distance for making an attack, or for repelling one made by the enemy.

If the enemy's cavalry continues to hold its ground, the battery should fire shrapnell from all its pieces, making use of its most decisive and effective projectile; if, on the other hand, he should move, the guns should fire round shot to hit at first graze, while the howitzers throw shell at a low angle. If the enemy's cavalry, instead of being compelled to retreat by this fire, advances to the attack, the battery should continue to fire calmly, and merely change the projectile at 600 paces, that is to say, commence firing canister shot from all its pieces.

Meanwhile its own cavalry will have advanced to execute the projected charge.

The battery should continue the fire until its cavalry comes up in line with it, when it should limber up to retire and retreat upon the second brigade at best pace.

The signal to limber up and retire should be given to the battery when its own cavalry has arrived in line with it, and not upon the advance of the enemy. It is necessary, to carry out the object in view, to stand *fast up to that* moment, and this proceeding is attended *with no danger*. Instead of permitting the projected attack to fall on him while at a halt, should the enemy advance to the attack, while the battery is still moving to the front, this circumstance should no further modify the conduct of the battery, than causing it to halt and unlimber as the enemy advances; it should open and continue firing upon him until its own cavalry has come up to it, when it should limber up and retire under protection of the supports.

Quick decision and prudent conduct should be displayed at this moment: in no case ought the artillery to turn about without accomplishing its object, for it might thereby endanger the whole issue of the charge.

To remain halted and to await the result of the attack is, on the other hand, as useless as it is dangerous.

The battery should, consequently, retreat on the nearest brigade without further ado. When the attack fails, the former should take up a new position in the vicinity of, and in line with the front of the brigade, keeping a proper interval between it and the flank, and fire on the advancing enemy to check his pursuit. Should the charge, on the other hand, succeed, the battery should follow the movements of the second brigade, while the first rallies; the battery proceeds as it had done before with the first brigade, thus preparing the way for a second charge on the enemy's reserve which possibly may have advanced.

It would be quite incorrect to follow the first brigade in the attack with the idea of breaking forth immediately after it, and pursuing the overthrown enemy with the fire of the battery; for, on the one hand, the issue of every charge is uncertain, and the horse artillery would be lost in case of failure; and on *the other, it* is not of importance that artillery should follow closely in rear of the victorious cavalry, as the best pursuit is a hand to hand one, and the artillery, by acting in the manner alluded to, would prevent the cavalry from using the steel.

Should the artillery advance, after a successful attack, in company with the victorious brigade to improve the occasion by its fire, this movement should not be executed before the confusion of friend and foe is disentangled by sounding the assembly and rally; and for this purpose there will be ample time after the retreat on the second brigade.

After considering both sides of the question, there appears to be nothing against the retreat of the artillery on the second brigade; but, on the contrary, that that measure must be looked upon as adapted to the safety of the Arm as well as to the circumstances of the combat.

If the horse artillery is ordered to the front, to pursue the beaten foe with its fire, it should not do so recklessly, nor separate itself from the cavalry beyond the scope of their protection; for a prudent commander will recollect that cavalry actions are of a versatile nature, and not unfrequently when victory appears certain, the tide turns in the opposite direction.

One exception to the rule, that the horse artillery should place itself on the flank of its cavalry, may occur in the pursuit of an enemy, namely, when the beaten cavalry retires through a defile, and there is no intention of following it: in this case the artillery may be suitably placed in front of the cavalry, opposite to the mouth of the defile.

5. *Carrying off the cavalry by artillery, when the former are beaten back; covering the retreat and protecting defensive positions.*

When the first brigade has not succeeded in its attack, it will be carried off by the second, and the horse artillery, which had retired in line with the front of the latter, should cover the retreat, check the enemy in pursuit, and act preparatorily to the charge of the second brigade.

Should the second brigade charge, the artillery should return to the nearest body, which meanwhile will have formed.

The artillery in these operations is always in position on the flank of the cavalry nearest to the line of retreat, or on that flank to which support is necessary.

If a brigade is not to wait to receive a threatened charge on the part of the enemy, it should send its battery to the rear before commencing the retreat.

The protection of a retreat with artillery against a superior enemy is executed in a different manner with cavalry than with infantry; in the latter case it is requisite that there be a continual connection with that Arm and that the batteries retreat with the prolonge; while in the former, in consequence of the great fluctuations attendant upon cavalry actions, and of the quickness of the movements, the horse artillery can only cover the retreat of its cavalry from positions taken up in rear in line with the front of the second brigade, and when possible behind irregularities of ground. It should take up new positions at an accelerated pace. These positions should lie so much to one side as to enable the battery to direct its fire upon the enemy in pursuit, without being masked by the retreating cavalry.

Each battery covering the retreat requires a permanent and special escort.

The above explanations contain what is most essential with regard to the destination and conduct of the divisional artillery. Should there be a special reserve artillery with a cavalry corps consisting of two divisions, it should remain at the immediate disposal of the general in command, who should detach a portion of his cavalry for its protection.

If the cavalry has to take up a defensive position in the line of battle, the divisional artillery alone will hardly suffice to protect it; on the contrary, it should look for a reinforcement of foot batteries from the reserve. Their object is more to form points of support by large batteries in rear of protective ground, thus affording a safe *point d'appui* to the masses of cavalry, than with the idèa of acting offensively with artillery, for batteries so formed are the mainstay of the defensive.

As an example of the effective support of a cavalry action by artillery, that of the battle of Liebertwolkwitz,* fought on the 14th of October, 1813, may be instanced. The French cavalry under Murat, consisting of the first and fourth cavalry corps under Latour and Valmy, upwards of 8000 sabres strong, had formed deep columns to the westward of Liebertwolkwitz, and the field of action in front of these masses was enfiladed by a powerful battery, established on the right flank of the village near Wachau. The cavalry of the allies consisted of 45 Prussian and Russian squadrons, with 24 horse artillery pieces, and towards the end of the action they were reinforced by 10 Austrian squadrons. The Prussian cavalry under Count Röder consisted of the reserve cavalry of the second army-corps; the East-Prussian, Brandenburgian, and Silesian cuirassiers, the Silesian lancers, the 2nd regiment of Silesian hussars, the 7th and 8th regiments of cavalry of the Landwehr, and the horse artillery batteries Nos. 7 and 8: the Russian cavalry, under Count Pahlen, consisted altogether of 19 squadrons, 3 regiments of Cossacks, and 1 horse artillery battery.

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* This battle, usually termed by English historians that of "Wachau" and included in the four days' fighting near Leipzig, was fought between the allied Austrians, Prussians, and Russians, under Prince Schwarzenberg and the French under Napoleon. A drawn battle; 16th October, 1813. *Vide* "War with Russia and Germany, 1812-13, by Lieut.-Colonel Cathcart," page 308; and Rocquancourt, page 518, 3rd Vol., where the 16th, and not the 14th, is the date given. Napoleon did not reach Leipzig, before the battle, until the 15th.

In this hot cavalry action, charge followed charge without intermission; the brigades, when hurled back, re-assembled under the protection of the reserves, and went anew to the attack. The horse artillery of the allies particularly distinguished itself by its mobility and powerful co-operation. The battle was fought on both sides with equal courage, and without either side being able to gain much ground. The fight was not relinquished without great losses: and we may judge of the energy of the attacks by the fact, that the three Prussian cuirassier regiments alone had 22 officers killed and wounded.

(c) *Conduct of horse artillery in an action of cavalry against infantry.*

The effect of the fire of infantry and the power of resistance of its closed masses, renders the success of cavalry against this Arm doubtful, unless great losses in action, exhaustion, and other unfavourable circumstances have engendered wavering and disorder in the ranks of the infantry, and have diminished its power of action. The safest means of producing in a short period the unsteadiness in the infantry requisite to successful cavalry action, is the effective use of artillery; the combination of horse artillery with cavalry, therefore, here attains its highest degree of importance, and the united effect of both Arms affords the greatest surety of victory.

However great may be the advantages which may accrue from the fire of artillery preparatory to a charge of cavalry, the former should, nevertheless, not be used under all circumstances against infantry; on the contrary, it should be dispensed with on every occasion, as in cavalry engagements, when the enemy can be taken by surprise, especially when the infantry is passing obstacles of ground in column of march, when it has become unsteady after a long fight, or when it has commenced its retreat in a somewhat disorderly manner.

Under these circumstances the issue of an attack "with a will" is not doubtful, when it has not been preceded by the fire of artillery. On the other hand, the position of cavalry is quite different, when intact infantry forms squares and stands ready to receive the attack, or when infantry is supported by artillery. In these cases, cavalry unquestionably requires its horse artillery to enable it to overthrow the enemy.

The conduct of the horse artillery in the action will vary according as the infantry is provided with artillery or not. If the infantry to be attacked is without artillery, and only supported by a weak cavalry, in whose presence somewhat may be risked, the preparation for the attack by artillery should be as short and energetic as possible.

The opening fire of round shot should be dispensed with, and the artillery should advance in the direction of attack designated to it up to 500 paces from the infantry, so as to open an effective canister shot fire against it. The cavalry should follow at a trot, and form up near the artillery, and charge as soon as the battalions fall into disorder from the shot, and as soon as the commander deems the effect of the artillery sufficient.

The course of this combat will certainly be quick and decisive. Should, on the other hand, the infantry to be attacked be combined with an adequate and well-served artillery, the victory will require greater sacrifices, and will not be thus easily gained.

If the enemy's artillery is so placed as to be in a position to prevent the cavalry from charging his infantry, or if it commands a defile which the cavalry must pass through, a combat between the two artilleries is inevitable.

The horse artillery should fight this battle with determination, make use of its capability for manœuvre in the most comprehensive manner, take advantage of cover to approach the enemy, making *détours* even for the purpose, appear at points where it is not expected, and summon every aid to its assistance, to surprise the enemy and prevent him from developing his whole power of resistance.

After the commander of the artillery has reconnoitred the enemy, he should lead his battery, under cover if possible, at an accelerated pace, to a previously selected position: it ought to lie to one flank, and its line of fire should strike both the artillery and infantry, thus having an object of considerable depth to fire at.

Ricochet fire, which is feeble and indecisive in effect, in such a case should be avoided; the first position, rather, should be taken up at an effective round shot range, of from 1000 to 1200 paces. Opening fire from this position will suffice to divert that of the enemy's artillery from the cavalry. Should the fire of the latter be materially slackened, the artillery of the attack should advance on the opponent by echellons up to 800 paces. From this point it should fire at the infantry with shrapnell; and finally, the batteries should advance at full speed up to 500 paces from the masses of the infantry, and prepare the way for the charge of the cavalry by a canister shot fire. Whether one section of the pieces should continue to fire round shot against the artillery must depend upon the effect of the fire of the latter.

To give the artillery the requisite freedom of movement, it should have a special escort sufficiently strong to protect it against the enemy's cavalry supporting his infantry. Should that cavalry be in force and enterprising, the artillery cannot figure quite so independently in this action; but should keep itself, according to the actual risk incurred, more or less closely connected with the masses of its own cavalry, so as to be seasonably supported by it.

Should the enemy's artillery have taken up an injudicious position, so as not to be in a condition effectually to molest the attack; or, should the ground permit of an advance under cover, and an unexpected charge on the flank of the infantry, in either of these cases it will be to the interest of the assailant to make a final attack upon the unprotected flank by a sudden and close canister shot fire, immediately succeeded by the rush of the cavalry; this manœuvre should, however, be simultaneously covered by another threatening the enemy in front.

The leading idea in this kind of action should always be that of overpowering the infantry, for that once accomplished, the artillery must be lost in conjunction with it or be compelled to retreat.

The history of war affords numerous examples of the great support horse artillery can give to cavalry in an action against infantry.

At the battle of Borodino,* the Russian General Uvaroff's attack upon the Italian infantry with 2500 horse was ineffectual, until it was supported by the fire of twelve horse artillery pieces.

At the battle of La Fère-Champenoise,† on the 14th of March, 1814, the French divisions of infantry under Pacthod and Amey, supported by a weak cavalry and six pieces, could only be overthrown by a numerous cavalry after a great number of horse artillery pieces were brought into action against them.

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* Battle between the French under Napoleon and the Russians under Kutusoff. This battle is termed by the French "La Moskowa." The absolute result was in favour of the French; 7th September, 1812. Being in possession of some interesting figures regarding this battle, I shall make no apology for inserting them here.

The French were 140,000 strong, the Russians 160,000. The loss of the former was :—

48 generals killed and wounded (9 killed)
37 colonels „ „ (10 killed)
6,547 officers, sub-officers, and soldiers killed
21,453 „ „ „ wounded

28,085 Total killed and wounded.

The Russian loss was upwards of 50,000 killed and wounded.

The expenditure of ammunition by the French was—

60,000 cannon-shots.
1,400,000 musket cartridges.

The duration of the battle was 10 hours, giving 100 cannon-shots, and 2300 musket shots per minute.

The proportion of killed to wounded . . . . . 1 : 3·27
„ „ „ to number of men engaged, very nearly . . . . 1 : 5

† Battle between the French under the Dukes of Ragusa and Trevisa and the allied Austrians, Prussians, and Russians under Blücher and Schwarzenberg. The latter were victorious; 25th March, 1814.

SECTION 29.—COMBAT OF THE RESERVE ARTILLERY.

1. *Historical sketch of the origin of reserve artillery, and the use of masses of artillery in battle.*

The great commanders of early days considered it judicious to concentrate artillery at determinate points in as large numbers as possible to produce great effect, and the Thirty Years' War* affords examples of the concentration of large batteries in front of the troops. Thus Tilley, in the first battle of Breitenfeld,† on the 7th of September, 1631, placed twenty field pieces in front of the imperial foot soldiery in one battery, and sixteen half-karthauns‡ (24-pounders) in a second, while the front of the Swedes and Saxons was covered by 100 guns in fourteen batteries.

At the battle of Burgstall,§ on the 22d of August, 1632, Wallenstein established a battery of eighty pieces in front of his left wing, to which the King of Sweden opposed a like number.

At the battle of Lützen,‖ on the 6th of November, 1632, the artillery of the Imperialists was united into one great battery; those of the Swedes, on the other hand, were distributed along the front, five heavy field pieces being placed in front of each of the four foot brigades, besides forty light pieces in the first division.

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* 1618-1648.

† This battle, sometimes, but erroneously, called Leipzig, was fought between the allied Swedes and Saxons under Gustavus-Adolphus II. and the Imperialists (Germans) under Tilly. The former were victorious. The Swedish guns used in this battle were the so-called "Leather guns."

‡ Cannon-royal—battering piece.

§ Battle between the Swedes and Protestant Germans under Gustavus-Adolphus and the Imperialists under Wallenstein. It is generally called "Alte-Veste and Altenberg." A drawn battle; 24th (not 22nd) August 1632.

‖ Battle between the Swedes under Gustavus-Adolphus and the Imperialists under Wallenstein. The former were victorious, but the great warrior and king was slain. *Vide* Schiller.

Used, as they were, in a far different manner from what would be considered correct now-a-days, this great mass of unwieldy guns merely served to open a battle by a heavy cannonade, at a range varying between 1500 and 2000 paces, or to repulse an attack. Their part was played, when the troops advancing to the attack masked their fire: they did not accompany the troops, for they were as ill-adapted for an advance as for a retreat, and generally became the prey of the victor.

The light pieces of that period formed the only exception; and at the battle of Lützen, those of the Swedes executed an artillery manœuvre, rare in those days, for the regimental pieces not only accompanied the advance to the attack, but were likewise combined into one battery in front of the left wing, which was suffering great loss from the imperial battery of seventeen heavy guns posted on the Windmill hill. We, consequently, find in the Swedish artillery the first germ of a certain mobility in action which the Imperialists were not slow to imitate, but nowhere the employment of heavy artillery on the move, and still less an intimation of a reserve artillery.

In the later wars, at the end of the seventeenth and the beginning of the eighteenth centuries, the conduct of artillery in battle was of the same stamp as that of the Thirty Years' War, though the regimental artillery was continually and systematically improved, and the position artillery was more decidedly separated from it. These classes of artillery are best characterised, the one by its feeble effect of fire, and the other by its immobility.

The genius of the great Elector cast a bright though passing ray of light on his artillery, when he ordered Lieutenant-Colonel Ernest von Weiler, with twelve light pieces drawn by complete teams and with their gunners on horseback, to accompany the cavalry, 5600 sabres strong, to Fehrbellin.* They took part in the action against the Swedes, on the 18th of June, 1675, and to such good effect that they essentially contributed to the victory.

In the first Silesian war, the Prussian regimental artillery was formed on a systematic plan, and constituted a remarkable element of line tactics. The 3-pounder battalion guns unlimbered at 500 paces from the enemy, preceding their battalion by about fifty paces. They were dragged by their gunners; at 350 paces they fired canister shot and advanced with their battalions, firing even up to the shortest distance from the enemy.

Under such a system, when the action turned out unfavourably, great losses in artillery were inevitable: at the same time, nevertheless, it is unmistakable, that a very effective support was thereby given in an infantry combat, an effect entirely owing to that system. The great King, as Beerenhorst says, repeatedly found fault with it on account of the risk the artillery must be exposed to when a proper success would be attained with that Arm.

The position artillery confined itself on the offensive to preparing the action from commanding points, with a view to driving back the opponent's artillery and to shelling his position; on the defensive, to occupying the position for the repulse of an attack, and to attain this end to the utmost of its power it appeared at the opening of the action in full force.

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* Battle between the Prussians under their king and the Swedes; the latter, though greatly superior in numbers, were signally defeated.

In the Seven Years' War, the effort to lighten the artillery material resulted in no remarkable alteration in these principles of the use of artillery. Merely lightening the pieces did not succeed in gaining the object in view, namely, the creation of a moveable artillery endowed with sufficient power of doing execution; because the organisation of the Arm did not make equal advances, as in this respect it remained far behind the infantry and cavalry. We have seen above the grounds upon which a return was finally made to the system of heavy guns at the end of each war, and how endeavours were made to increase the mobility of field artillery by the introduction of horse artillery; the latter, however, as yet existed in too small numbers, generally speaking, to make any material alteration. The battles of the Seven Years' War were fought with a considerable quantity of artillery in proportion to the number of troops engaged; thus there were:

					Men.	Pieces.		Per cent. per hominem.
At	LOWOSITZ	on the	1st Oct. 1756,	with	24,000	102	or	4
„	PRAGUE	„	6th May, 1757,	„	64,000	192	„	3
„	COLLIN	„	18th June, 1757,	„	34,000	102	„	3
„	ROSSBACH	„	5th Nov. 1757,	„	21,600	72	„	3½
„	BRESLAU	„	22nd Nov. 1757,	„	30,000	138	„	4½
„	LEUTHEN	„	5th Dec. 1757,	„	32,000	167	„	5
„	ZORNDORF	„	25th Aug. 1758,	„	32,000	193	„	6
„	KUNERSDORF		12th Aug. 1759,	„	48,000	230	„	4½
„	LIEGNITZ	„	15th Aug. 1760,	„	27,000	120	„	4½
„	TORGAU	„	3rd Nov. 1760,	„	44,000	244	„	5½
„	FREIBERG	„	29th Oct. 1762,	„	27,000	100	„	4

A peculiar artillery of reserve never existed, unless a few pieces accidentally unemployed at the commencement of the action can be so called.

The French artillery, which since the days of Louis XIV. has always been a peculiarly favoured Arm, after the Seven Years' War adopted Gibreauval's system, and on the great augmentation of 1794, introduced horse artillery on the Prussian model, obtaining by these two measures a solid *matériel* and a greater capacity for manœuvre than the other artilleries. It was the first to abolish the battalion pieces, and introduced divisional batteries in their stead, one or two being attached to each division; it likewise first formed a peculiar artillery of reserve for battle. Both arrangements were subsequently adopted by all other artilleries, and became the groundwork of modern artillery tactics.

The utility of reserves became daily more clearly recognised. How important an effect the sudden appearance of a proportionately small reserve of artillery accompanied by fresh troops may have, was demonstrated at the battle of Marengo* on the 14th of June, 1800; in this action the twelve pieces of Boudet's division, which had only just arrived, checked the victorious career of the Austrians by their unexpected and effective fire; they became, too, the supporting point of all the manœuvres which turned the fate of the action. It was the last barrier of the already-beaten French army; by it the French commander-in-chief supported his discomfited and exhausted divisions; and from it, and the impetuous attack of fresh forces, resulted the change which snatched the blood-bought victory from the Austrians.

Up to this epoch a large number of pieces were employed in most battles, but the peculiar use of masses of artillery was not introduced until afterwards; on the contrary, the conduct of artillery continued to be, far into the Napoleon era, essentially what it was in early days. The camp at Boulogne was the first school of the tactics in mass, henceforward destined to be successfully practised on the field of battle, and the war of 1805 gave the first opportunity of bringing them into play.

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* Battle between the French under Napoleon and the Austrians under Melas. The former were victorious.

The first example of the employment of artillery in mass was given at the battle of Friedland,* on the 14th of June, 1807. The main body of the Russian army, 60,000 strong, crossed to the left bank of the Alle, and took up position before Friedland with six divisions, to the right and left of the mill-race; in this position they had for hours to withstand the attack of two divisions of Lannes' corps; these divisions advanced between Posthenen and Henrichsdorf with a considerable interval between them, they were proportionately weak, but covered by a swarm of tirailleurs and masked by high corn-fields. The Russians remained unconscious of their decided superiority in numbers, and not only suffered great losses from the murderous artillery and tirailleur fire in their deep columns, but likewise lost most valuable time. The gradual appearance of the corps of Ney, Victor, and the Guards, as well as of great masses of cavalry, brought the numerical superiority in favour of the French, who embraced the curve of the crowded Russian position, and concentrated their fire upon it from all sides. After the battle had raged for eleven hours with alternate success in single partial combats, Napoleon determined on making a final stroke upon the

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* Battle between the French under Napoleon and the allied Russians and Prussians under Benigsen. The former were victorious.

Russian left wing, and upon the two divisions under Bagration, which were separated from the rest of the army by the mill-race. The first corps under Victor and the sixth under Ney, the former on the left, the latter on the right of Posthenen, were ordered to execute this operation.

The account of the movements of the artillery in this attack by the artillery General of brigade Sénarmont, communicated to and published in the pamphlet entitled, "Ueber Führung und Gebrauch der Feld Artillerie,"* Berlin, 1851, states as follows: — "General Victor, commander-in-chief of the first corps, after communicating his intentions, left the artillery General of the corps in perfect freedom to direct the movements of that Arm. In pursuance of which, the latter deemed it judicious to divide the whole artillery of the corps (thirty-six pieces), with the exception of six pieces, into two great batteries, of which the first battery (of the left wing) consisted of fifteen pieces, and the second (of the right wing) of a like number. The left battery was to take position in front of Posthenen to cover the left flank of the army-corps, and if possible to annihilate the enemy's batteries and masses of troops there posted. The battery on the right, which in the first instance was posted in front of the Sortlacker wood, advanced during the action up to the front of the outermost right wing of the sixth corps (Ney). The artillery thus distributed advanced suddenly up to its first position for action within 600 paces of the enemy, and after occupying five or six others, subsequently approached up to within 300 paces, from whence it commenced a running fire (*feu roulant*) delivered with the greatest vivacity. The general of the artillery observing the formidable effect produced, ordered it not to fire any longer at the enemy's pieces, which were equal in number to those of the French, and which partly took them *en écharpe*,* so as to compel the enemy to retreat. He then went up to within 150 paces of the front of the enemy. The two batteries had approached so close to each other that they now only formed one battery, and from that moment only fired canister shot. The enemy's masses opened out and reformed. At length when they began to waver, the Russian cavalry put itself in motion to attack the battery, the general of artillery at once ordered a change of front, and by this manœuvre turned the whole of his fire upon the cavalry, which, after taking up two positions, disappeared. At the same moment as the cavalry advanced against the pieces, the commander-in-chief sent a battalion forward to their support. Dupont's division, which advanced and overthrew the enemy, was well supported by five pieces of the right battery. Loss—killed, 1 officer, 10 gunners, 53 horses; wounded, 3 officers, 42 gunners. Shot fired, 2516, of which 362 were canister shot."

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* On the Command and Use of Field-Artillery.

It is undeniable that General Sénarmont trod a new path in giving this example of the use of artillery masses, and that it is one worthy of being followed; it deserves to be remarked, too, that he had not a reserve artillery awaiting his orders to be brought into use, but that he had first to procure the means for this attack, by combining the divisional batteries of the first corps. The formation of two large batteries, to cover the wings of the corps, advancing from different points upon the same object, and concentrating their fire upon it, was well calculated for the object in view. According to other accounts, the battery of the left wing, under the command of the Emperor, advanced up to the brick-kiln of Posthenen; and, if this be true, it must have stood when preparing the attack at about 1200 paces from the Russian artillery. According to the narrative of the general of artillery commanding the movements, we are bound to assume and suppose that he advanced, in the first instance, up to a position at short round shot range, after the Russian artillery had been considerably weakened.

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* Obliquely.

According to the other accounts above alluded to, the battery of the right wing made its appearance later than that of the left, and certainly after the great Russian cavalry attack, under Kollogriboff, against the right flank of Ney's corps.

The close advance of the French artillery to the Russian masses, up to the very effective canister shot range of 300 paces, is highly praiseworthy; but its further advance up to 150 paces appears only to be justified by the advancing infantry masking their fire, and by its desire to get up as close as possible to the enemy; for, supposing that the batteries were composed of the smallest calibres only, each battery would consist of ten 6-pounders, two 4-pounders, and three howitzers; under these circumstances a distance of 300 paces would have been quite close enough to give a very effective canister shot fire. The statement of the expenditure of ammunition is interesting: whence it follows, that the combat of the artillery was chiefly fought with round shot and shell, as each piece only fired twelve canister shot and seventy-two round shot or shell. The ground near Friedland, on the left bank of the river Alle, is even, and interspersed with gently sloping eminences, consequently favouring in an unusual manner the attack of the artillery against the open position of the closely-thronged masses of Russian infantry.

The battle of Wagram,* on the 6th of July, 1809, affords another, though less successful but still magnificent, example of the employment of artillery in masses. The formation of the famous large batteries of the centre was effected with a view of distracting the attention of the Austrian commander-in-chief from the operations about to be undertaken against his left wing, and, if possible, to prepare for breaking his centre; six foot and four horse artillery batteries advanced with sixty pieces in two columns, covered on both flanks by a considerable number of cavalry, and followed by large masses of infantry against the Austrian centre; they deployed and advanced, the horse artillery at a trot, the foot artillery at a walk, without firing a shot, up to canister shot range of the enemy's line. During the advance into this position for action, fifteen French pieces were dismounted by the numerous and well-served Austrian artillery, so that only forty-five could deploy; after which forty-five others of Macdonald's corps gradually joined them. To the fire of this enormous battery, which continued for half an hour, succeeded the attack of imposing masses of cavalry and infantry; but they threw themselves upon troops completely unbroken, and were repulsed. Before the formation of fresh reserves was completed to renew the attack, the Austrian commander-in-chief was induced, in consequence of the occurrences on his left wing, to commence the retreat; so that it may be said with perfect truth, that the great attack against the Austrian centre did not decide the day, but that the turning attack under Davoust did.

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* Battle between the French under Napoleon and the Austrians under the Archduke Charles. The former were completely victorious.

If we inquire into the reasons of the failure of this great attack of artillery, executed on such an enormous scale, and, with still greater energy, upon ground fully adapted for the purpose, we can only form conjectures as to their nature; no one will, however, dispute that the main causes of it were, the firmness with which the Austrian grenadiers and Kollowrath's corps endured this terrible fire; the courage with which they attacked General Macdonald's advancing columns in flank, and, despite the determination of the French, forced them to retire to their artillery; as well as the resistance of the Austrian squares against the attacks of the cavalry of the guard, and the cuirassiers under Nausouty which reached even up to their bayonets; and finally, the courageous behaviour of the Austrian artillery. Putting these beyond the question, the tactical plan of the action appears to have contributed to its failure, and especially the mass of artillery to have been too large to be commanded properly and with unity of purpose, as well as to get into position with order and precision. If we consider for a moment, that 100 pieces of artillery take up a front of from 1500 to 2000 paces, the impossibility of commanding such a mass, and the probability of great confusion among the batteries, hastening from various points, will be granted. Another cause of failure might well be that the Austrian artillery was not silenced by a regular artillery combat, before the French advanced to canister shot range; by which it suffered so great a loss that the two first columns of the artillery of the guard which advanced, one-fourth part never deployed. In consequence of the slow pace of the French foot artillery at a walk, and of the horse artillery at a trot, accompanied, too, by a large train of waggons, their total loss must have been enormous. The advance of the artillery up to within canister shot range of the enemy's artillery gives evidence of a praiseworthy energy; but it would have been more conformable to the object in view to have first taken up a position at round shot range, in consideration of the unweakened fire of the enemy's artillery. Had the cannonade thus engaged been continued in a suitable manner, and had it silenced the opponent's artillery, which might fairly have been expected from the superiority of number, and had the artillery advanced in echelon to fire with canister shot, and that fire had been finally directed upon the enemy's infantry and cavalry, the result might have been different in spite of the enemy's courage.

If the above examples exhibit the use of artillery masses in an offensive sense, the battle of Borodino* and Gross Görschen† afford two others, in which the large batteries were employed in a defensive one. In the first of these actions, according to the account of the Marquis of Chambray, the Russian commander-in-chief about 3 P.M. attempted to regain his first position by an offensive movement against Semenofskaya; it was executed, however, in such a dilatory manner, that Lieutenant-General Sorbier, commanding the French artillery, and Murat, were enabled to unite eighty pieces in front of Semenofskaya, whose terrible fire brought the Russians to a stand, and finally compelled them to retreat.

At the battle of Gross Görschen General von Horn, reinforced by the brigade under Steinmetz, stormed the village of Rahna and overthrew the masses of troops posted on the heights in rear of it; the Prussian cavalry, which supported him, likewise made several successful charges; these occurrences rendered Napoleon apprehensive of his centre being broken. He advanced twenty-two battalions and the cavalry of the guard against that village, and simultaneously united sixty pieces of the artillery of the guard under Generals Drouet and Dulauloy into one large battery on the heights between Kaja and Starsiedel. The fire of this battery checked the advance of the allies, and facilitated the advance, at a later period, of the French reserves, as well as the recapture of the village of Rahna.

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* *Vide* page 179. † Lützen, *vide* page 186.

Up to this epoch the formation of large masses of artillery was confined to the French army; reserve artilleries certainly existed in the allied armies, but they were for the most part used in succession to support partial combats.

The first exception was at the battle of Gross Beeren,* on the 23rd of August, 1813, which may be termed peculiarly an artillery combat; for the pouring rain confined the infantry simply to the use of the bayonet. Lieutenant-Colonel von Holzendorff of the artillery opened the engagement with 36 Prussian pieces and a Russian 12-pounder battery at 1800 paces; the fire was lively, and the artillery advanced by alternate batteries during its progress. The infantry followed at a distance of 300 paces. When they had reached up to 1200 paces, 16 additional pieces were brought into action, so that 64 cannonaded the French position. This figure was increased to 82, and Reynier's artillery was nearly completely silenced. The Prussian infantry, under the command of General von Bülow, accompanied by the light batteries, then attacked. In this attack we may remark the following peculiarities: firstly, that the foot and horse artillery were separated, the former acting against the front, while the latter engaged the flank of the enemy's position; and secondly, that the use of a mass of artillery was not a final act of the battle, but that it appeared quite at the beginning.

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* Battle between the French under Marshal Oudinot and the allied Prussians, Russians, and Swedes under Bülow. The latter were victorious.

Further examples of a systematic use of large masses of artillery are furnished by the battles of Ocana,* Bautzen,† Hanau,‡ Brienne,§ Grochow,‖ and Warsaw.¶

In the above historical sketch an attempt has been made to show what powerful means of deciding an action is afforded by the use of masses of artillery. The instances we have adduced are taken from earlier wars: examples, however, are not wanting at the latest period, which go to prove that their importance is not less acknowledged in the present day.

The campaign in Hungary in 1849 demonstrates the fact that the Russian and Austrian artilleries thought highly of the employment of masses of artillery; and we have only to read the account of the battles of

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* Battle between the French under Soult and the Spaniards under Arrizaga. The former were victorious; 19th November, 1809.

† Battle between the French under Napoleon and the allied Russians and Prussians under Witgenstein. The former were victorious; 20th and 21st May, 1813.

‡ *Vide* page 131, note.

§ Battle between French under Napoleon and allied Russians and Prussians under Blücher. Drawn battle; 28th January, 1814.

‖ Battle between Russians and Poles, in which the former were defeated; 20th February, 1831.

¶ Battle between the Russians under Paskievitch and the Poles, ending in the capture and occupation of the city by the former, 7th and 8th September, 1831.

Kapolna,* Szegedin,† Temesvar,‡ and Harkaly,§ to be assured of it.

If we further take into consideration that all artilleries have made remarkable advances in organisation and in science as applied to the Arm, and that its effect of fire and mobility is increased, we must come to the conclusion that the power of this agent has been augmented, in proportion as the formation of such masses on the battle field has been facilitated, and their effect, when formed, thereby rendered more formidable. Everything, in fact, seems to indicate that the artillery will still more than ever constitute the most important element for deciding battles.

As we now proceed to consider the use of reserve artillery more closely, we shall take an opportunity of detailing the manner of formation and employment of masses of artillery.

(2) *Object and use of reserve artillery.*

A single division with two batteries attached has no reserve artillery; its batteries are required in line, and it must be dependent, with respect to a reserve, upon the reserve artillery of the army-corps. The reserve artillery of an army-corps consists, according to the distribution given in section 4, of

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* Battle between the Hungarians under Dembinsky and the Austrians under Windischgrätz. A drawn battle. War of Independence, 26th and 27th February, 1849.

† Battle between the Austrians under Haynau and the Hungarians under Dembinsky. The former were victorious; 2nd August, 1849.

‡ Battle between the allied Austrians and Russians under Haynau and the Hungarians under Dembinsky and Bem. The latter were defeated; 9th August, 1849.

§ Battle between the Hungarians under Görgei and the allied Austrians and Russians. A drawn battle; 2nd July, 1849.

three 12-pounder batteries,
one 7-pounder howitzer battery, and
two horse artillery batteries,

giving a total of six batteries, or the greater moiety of the whole artillery of the corps. To this, too, belong the ammunition and other columns, with regard to which reference may be made to the details given in section 13.

The principle of modern field tactics essentially consists in the reciprocal support of the different Arms, and in the seasonable employment of the reserves. The reserve artillery, as an important element of the reserve and from the nature of its duties, should be attached to it; its object, consequently, will be two-fold:

A. To support the divisional artillery in action by detached batteries, and

B. To bring matters to a decision, by uniting the batteries of the reserve still available, in conjunction with the infantry and cavalry of reserve.

To a certain extent these objects stand in opposition to each other; for while the one demands the use of the batteries for minor combats, the other requires the force to be concentrated to bring matters to a decision. To reconcile these apparent contradictions, it is requisite that the commander of the Arm should exercise great discretion, so as to combine a seasonable support to the divisional batteries with a judicious economy of the amount of force so employed; and that he should not favour the one object more than the other, as they are of equal importance. The dispersion of the reserve artillery should be avoided; indeed, every exertion should be made to keep it together. An officer who should keep back the supports until the division is beaten, can no longer hope for victory; the most he can do is to cover the retreat: but he, on the other hand, who brings the reserves into action too soon, or disperses his artillery to support the line of battle, employs the one and the other unseasonably, and will be beaten by an enemy who knows how to keep both properly in hand.

At the battle of Harkaly,* the Hungarians had already brought the whole of their artillery, consisting of 90 pieces, under fire, before the Russian General Paniutin advanced his reserve artillery to the front of his right wing, and by its assistance decided the battle.

It is difficult to form a precise notion beforehand, of how many and which batteries should be employed as batteries of support, and which should form the main reserve, and to come to such a predetermination would be to hinder the free use of the Arm; nor is it practised in our service.

Considering, somewhat more closely, the first of the abovenamed objects of the reserve artillery, we may observe as follows:

(a) *The employment of detached reserve batteries for the support of the divisional artillery.*

The 2 batteries of artillery permanently attached to divisions, each of 12 battalions and 1 cavalry regiment, are not in conformity with the adopted proportion of 3 pieces per 1000 combatants, nor are they sufficient for the independent action of the division, and they can only be considered adequate when a seasonable reinforcement of artillery may be expected from the reserve. If this is not to be anticipated, a reinforcement should be sent at the outset to detached divisions; it should be considerable in proportion to the difficulties to be encountered, and the improbability of support from the reserve artillery. The artillery attached to divisions on advance or rear-guard, or when acting as flank corps, should be reinforced with heavy or horse artillery, according to existing circumstances, and when defile actions are anticipated howitzers should be added thereto. The same holds good with respect to detached divisions of cavalry, which ought to receive an addition of from two to three horse artillery batteries, according to the nature of the service they are likely to be employed upon, and to the difficulties to be expected.

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* Vide page 194.

In a general action the following rules should be observed: only to bring a small portion of the artillery under fire at its commencement,—to reinforce it according to the resistance of the enemy,—and to retain a considerable portion for unexpected occurrences, and for the final decisive stroke. The divisional batteries should therefore suffice for the opening of the engagement, and they should only be reinforced when the necessity for so doing makes itself apparent. These rules, derived, as they are, from the history of war, and borne out by experience, should be adopted in consequence of the great duration of modern battles, in which the opposing forces are much weakened by partial combats anterior to the crisis: they are not, however, of universal application, for an exception must be made when a numerous artillery has to appear at the opening of the engagement.

In the following instances it would be wrong to open the action with a few pieces only, and then gradually to reinforce them: if the enemy is in possession of a position fortified by entrenchments, villages, or defiles,—in forcing the passage of a river,—in debouching from a defile in the presence of an enemy,—or, in attacking an enemy after he has debouched from a defile with only a portion of his force, with a view of destroying him before reinforcements can arrive. In such cases, on the contrary, a superior force of artillery should be employed, and that without delay. Should the artillery under such circumstances be employed merely in detached bodies, the combat will break up whole divisions engaged piece-meal at villages, defiles, and thickets, and the result be nevertheless doubtful. This is of the greater importance, as after the success of an introductory attack made with a superior number of pieces, a portion of the batteries so used can be taken back into the reserve, and may be afterwards employed in their more legitimate manner; while, by the contrary mode of proceeding, namely, gradually reinforcing the few pieces engaged, the batteries generally become entangled in the turmoil of the combat beyond the hope of recall and are thus lost for the after-fight.

If, on the other hand, circumstances are not of a nature to require a great development of the reserve artillery at the commencement of an action, then a gradual reinforcement of the line of battle should take place for the following objects:

(α) To reinforce the divisional batteries when exposed to a superior fire, or, when they have suffered from such a fire, to relieve them.

(β) To occupy with artillery fresh points which are discovered to be of importance, without weakening that already in action, &c.

(γ) To attack the enemy at unprotected points without delay, or to regain advantages which the enemy may have gained.

To what extent the reserve artillery should be employed for these objects is dependent upon the following considerations: whether the army-corps fights *independently*, and can only trust to its own strength *to carry on and* decide the combat, or whether it forms a portion of a large army, and can appear in full force at the outset to execute the service on which it is employed, and can expect support from the general army-reserve at the decisive moment.

We will now turn to the second task assigned to the reserve artillery, in the fulfilment of its duty.

(b) *The use of masses of artillery in deciding an action.*

It will be first necessary to form a correct idea of what "artillery-masses" are, in contradistinction to an agglomeration of pieces as used in most of the battles of the wars of an earlier period.

Agglomerations of pieces in action are identical with large batteries. Their position qualifies their efficiency; they should only be used from *one* position, as they are wanting in mobility, and their object is mostly of a defensive nature.

Artillery-masses, on the other hand, are employed independently and generally offensively; combining great effect of fire with capability of movement, they should concentrate their fire upon the point to be broken through, and advance to the closest quarters with the enemy, so as to overwhelm him; the work should then be completed by the charge of reserve infantry and cavalry.

Artillery-masses may be employed both on the offensive and defensive for the various purposes in an action; to break the centre (Wagram* and Gross Beeren), to attack a wing (Friedland), in the passage of a river (Ostrolenka), in the attack of entrenched positions (Warsaw), for defence against an attack in force (Gross Görschen and Borodino), to re-establish an action (Marengo), and to break off an engagement (Bautzen).

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* *For the* above battles vide the following pages respectively: 189, 192, *185, 115, 141,* 155, 179, 184, 155.

These instances, varying so much in their nature, after all demonstrate that in the use of artillery-masses there are only two points in view; either to bring matters to a favourable decision, or to avert a crisis when it is likely to prove an adverse one. We may likewise observe that the moment of their appearance is not confined to any particular period of an action, and that it would be not more erroneous than contrary to experience, to decide that they should only be used at the end of an engagement.

The proper moment for their deployment is generally when both parties are somewhat exhausted by a long combat, and when a last effort may ensure a favourable result; but this is not always the case, and the employment of masses of artillery is by no means invariably the last act of a battle.

Every period of an action may offer a favourable opportunity to bring them into use. At the opening, to overcome the difficulties of a position by a superior force of artillery, and at the same time to protect the troops. During an action, to give a favourable turn to the fight. At the close, either to overwhelm the enemy with all available strength, or to repulse him.

It is the peculiar business ofthe commander-in-chief to hit the proper moment, and to bring it to good account.

The particular point at which they should be employed, is what is termed the key of the enemy's position, getting possession of which decides the contest; the choice of it is influenced by the position, the line of retreat and the turn the fight may have taken.

The ground upon which artillery-masses are to figure, should be favourable to the movement and deployment of the columns; it should be of sufficient breadth to enable the pieces to draw up in position; and it should afford a firm open field for fire without let or hindrance. It will be peculiarly adapted to the purpose, if, in addition to the above qualities, the ground falls with a gentle slope towards the enemy's position.

One essential condition of success is this: that the troops to be attacked should be in the open field, neither partially nor wholly protected from direct round shot fire by undulating or covered ground, and that there should be no obstacles to the advance of infantry and cavalry to the charge. Obstacles which divide the ground into two parts, or render the advance up to canister shot range difficult, such as ditches, dikes, meadows, thickets, &c., are likewise disadvantageous.

The strength of the artillery-masses is a matter of great importance. The mass should not be so unwieldy as to lose its capability of manœuvring, for success is not merely dependent upon the number of the pieces, but upon the order and precision with which they deploy. Two batteries should be considered as the minimum, and six as the maximum of an artillery-mass. Forty-eight pieces, formed in two regiments of 3 batteries, require, with regulation intervals, a breadth of 1000 paces; and supposing these intervals reduced to 15 paces, which is perhaps permissible, they will still require 700 paces. A larger mass should not be placed under the orders of one commander, if we would look for the requisite order in the movements and deployment of the columns. If a still more numerous artillery is available, it should be organised into separate masses, under the orders of independent commanders.

To surprise the enemy by the attack is one of the most essential conditions of its success, as by that means we can best prevent his making counter-movements. It will be a complete surprise, if the point of attack is sufficiently long concealed, and if the masses can be concentrated opposite his reserve under cover of the ground, and the attack be then commenced without loss of time.

It is of no less importance that the whole available strength should advance simultaneously, so as to crush the enemy by its overwhelming power; advancing batteries gradually against an intact artillery only too easily leads to their destruction. Upon these grounds it is desirable to be able to draw all the batteries destined for this service from the reserve, and not to be obliged to collect them from different points of the field of battle. The tedious operation of uniting artillery from various points not only occasions loss of time, during which the happy moment may be irretrievably lost, but it is hazardous in another point of view, because it weakens the line of battle, it deprives the troops of the artillery which is to be withdrawn, and finally attracts the enemy's attention.

The distances at which the masses of artillery should take up their position, are dependent upon the condition which the enemy is in at the point to be attacked.

If his troops are still intact, adequately supplied with artillery, and considerable resistance is to be anticipated, it will be necessary to continue the engagement for a longer period with the assailant's artillery than would under other circumstances be the case. It is impossible for the artillery to advance at once up to canister shot range of the enemy, if he is in a condition to act energetically; on the contrary, the combat should be opened by a cannonade, the object of which is to damage the enemy's artillery. This, however, should be no tedious cannonade, but should be conducted with the greatest energy at a distance of from 800 to 1000 paces, firing round shot, shell, and shrapnell. If the assailant's artillery is in superior force, as we have presupposed, this combat will not be one of long duration.

As soon as the enemy's pieces have materially slackened their fire, the artillery should advance by echellon up to 500 paces, to fire canister shot on the enemy's line, and latterly it should direct that fire upon the infantry, and thus prepare the way for a charge of its infantry and cavalry.

If, in the other case, the opponent is already shattered by previous combat, and the effect of his artillery is no longer important, it will not be requisite to open the cannonade from round shot range; in such a case, the artillery should open at once from close quarters with canister shot, and the crisis thus brought on should be improved to the utter disbandment of the enemy.

The method of the attack in a tactical point of view.

The line of battle (of the artillery mass) may be formed with one continuous front, or with several detached portions all firing concentrically upon the same point.

The adoption of the one or the other style of position must depend upon the nature of the ground, and upon the position of the enemy.

These attacks by artillery, supported by the united infantry and cavalry of reserve, generally take place in one of two ways:

As an attack to break the centre, or,

As an attack on the flank.

The attack on the centre presupposes the due engagement of the rest of the enemy's troops. The moment at which it is commenced, and the condition of the troops at the point to be attacked, are most critical. Against good troops success is doubtful, as at Wagram;* against shattered troops, only capable of acting feebly, it is certain; and this method of attack is the more to be counselled, as the victory will be attended eventually with strategic advantages.

Should it be decided upon, the line of battle can only be formed parallel to the enemy's position, and, when the ground permits, one continuous line should be taken up; because the angular position of one wing of the attacking artillery exposes in turn its flank to the portion of the enemy's front which is not attacked.

The method of attacking in flank, the only one which has been used of later days, consists in surprising the enemy on a flank, by advancing under cover and thus making sure of success. For this purpose it is necessary fully to employ the enemy in front, and to execute the attack in flank by troops especially employed on that service, thus preventing him from forming a front parallel to the flank attack, and from simultaneously ensuring his line of retreat.

In this method the line of battle of the artillery, formed in two separate detachments, should be composed of two faces, making a re-entering angle; by this means the enemy's flank is embraced, and the fire of large masses of artillery may be concentrated upon the point of attack. The foot artillery takes up this position in front, and the horse artillery in flank.

A proper combination of the attack of the artillery with that of the other troops should be satisfactorily organised, and they should so alternate with each other that the charge of infantry and cavalry may immediately succeed the fire of artillery.

The great extent of front, which such masses of artillery occupy, does not admit of the infantry forming on its flanks; it will be necessary, then, in order to concentrate the force on one point, to place the infantry behind the line of battle of the artillery, formed in column of attack in readiness to advance; while the cavalry should form on the flank of the line of battle for a similar object, and for the purpose of protecting the flanks of the artillery.

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* *Vide* page 189.

By thus placing the infantry in rear of the artillery, we shall certainly be acting against the fundamental principle, of never exposing two objects to the enemy which can be struck with one shot; but there is no other possible formation which will ensure the charge of infantry immediately succeeding the attack of the artillery.

When the power of resistance of the enemy is broken by a close, lively, and continuous fire of artillery, the infantry should advance through the intervals between the pieces, and the cavalry from the flanks, for the last struggle. The batteries whose fire is thus masked, should cease firing, the others continue firing, but so as not to endanger the troops; all the batteries, however, remain unlimbered to await the result of the attack. In the case of an unsuccessful issue, the troops beaten back should re-assemble in rear of the line of artillery, who must check the pursuit by a lively fire, and prepare the way for a fresh attack.

Finally, we must remark, that the union of the reserve artillery, composed of batteries of various calibres, endowed with unequal powers of locomotion, may be looked upon as an evil, and that a homogeneous mass might perhaps answer the purpose better; this fault is, nevertheless, neither avoidable in consequence of the multifarious methods in which the reserve artillery must be *employed*, nor is it of much importance. At the battle of Friedland* both masses of artillery consisted of three different light calibres, and yet they rendered important services, so much so that they will be held up as an example to all time. The proper use of the mass is of more importance than its composition. No consideration in an artilleristical† point of view can have any weight, as regards the unequal effect of the pieces, because the distance at which they should be employed is such that a good effect may be expected from all calibres; and the unequal powers of locomotion will be of no greater account, if the following rule is observed: Never to form foot and horse artillery in the same column, when it is possible to use each kind according to its specific capability.

The whole of the reserve should be united in a position of rendezvous.

The natural position of the reserve is in rear of the centre of the army corps, about 2000 paces behind the most advanced body under fire.

The variety of circumstances of ground, and of the manner in which it is to be made use of, make alterations in many ways in the above, and may necessitate the advance of the reserve during the course of the action, according to the turn affairs may take; but there will always be one main point to be cared for, namely, to keep the artillery mass out of the enemy's sight, by taking advantage of cover, and beyond the range of the fire of his artillery, so as to ensure a freedom of movement in every direction, and to keep it at such a distance as to be able to support threatened points.

The existence of any elevations of ground in the neighbourhood of a position is an advantageous circumstance, as they afford the commander a clear view of the field of action, and facilitate his knowledge of his position relative to that of the other troops.

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* *Vide* page 185.

† Vide page 19.

SECTION 30.—THE PURSUIT.

The pursuit from the field of battle may be made in two ways; viz., indirectly, or directly.

The direct pursuit should be confided to a powerful advance guard, composed of all Arms; cavalry should be attached to it by preference when the ground is favourable.

This advance guard should execute the duty of pursuit in the fullest acceptation of the term, and the cavalry should play an important part therein. The latter can only be considered the Arm for pursuit, *par excellence*, when the troops to be pursued are already considerably disorganised. It cannot produce such a disorganisation by its own unassisted powers; an adequate number of horse artillery pieces are, therefore, attached to it.

The howitzer battery should render excellent service in the pursuit, as its projectiles thrown up to the front of the retreating column are admirably calculated to increase the existing disorder into the extremity of confusion.

The advanced guard, thus constituted, should follow the enemy upon the same road as he retreats by; it should hotly press the rear guard, and should not permit it to take up a position from which it can make any serious resistance. The main body will thus be frequently compelled to reinforce its rear guard and to delay its march; it will be eventually forced to take refuge in night marches, so as to get a start of its pursuers, and to relieve it from the continual pressure. These night marches, however, soon accomplish the disorganisation of the beaten and disheartened troops, and make the succeeding crisis all the more perilous.

Indirect pursuit consists in following the retreating foe merely with a portion of the force, along the road which he follows; while the main body advances upon a side road parallel to it, so as to anticipate him at every position he may select, or, at least, to take such positions in rear. This will cause the enemy to hasten his retreat to the utmost; it will produce his final disorganisation, and compel him to abandon everything which may hinder his march.

Indirect pursuit, too, gives the victor the advantage of avoiding or of shortening the delay caused by sanguinary rear guard actions, and by thus marching parallel to the enemy, of entering upon a country which has not been exhausted for the maintenance of the enemy, whereby his own will be facilitated.

SECTION 31.—BREAKING OFF AN ACTION.

Before coming to a decision to break off an action, we should be satisfied, that the forces available are inadequate to the further pursuit of the original object of the engagement, without incurring the most serious danger. The practicability of this measure is dependent upon the existence of a sufficient number of intact troops, so as to be able to disengage the main body from the action, and to ensure its retreat to a position in rear.

A very effective method of accomplishing this object is to execute sudden flank attacks, or to advance the whole reserve cavalry and horse artillery.

At the battle of Bautzen,* on the 21st of May, 1813, it was thus that the Russian cavalry, under General

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* *Vide* page 155.

Uvaroff, composed of the first and second divisions of cuirassiers, forty squadrons strong, accompanied by the whole of the horse artillery batteries, advanced against Purschwitz, to cover the retreat of Blücher's corps and to break off the engagement.

The sudden advance of the reserve cavalry and horse artillery will at all times produce a considerable moral impression upon the victorious enemy. The main body should take advantage of such a moment to disengage itself and to commence the retreat. The divisional batteries should continue in the closest connexion with the infantry, and retire firing; the heavy batteries of the reserve detached to divisions should rejoin the reserve, and in conjunction with the rest of the reserve batteries occupy positions in rear, so as to carry off the main body, the necessary orders being duly communicated to the commander of the reserve artillery.

SECTION 32.—COVERING THE RETREAT.

As soon as the order of the general in command to commence the retreat reaches the commandant of the artillery, he should dispatch an officer to the ammunition columns to indicate the road they are to take. They should continue their march until they arrive at the ground decided upon as the first halting place for the army; here they should await their batteries, supply them with ammunition, and then resume their march. Another officer should carry the order to the rest of the ammunition columns, posted further to the rear, to retreat upon a point indicated with accuracy, and there await further orders.

Other officers should take the order to retreat to the staff *officers* of the artillery, pointing out the direction *to be taken.*

Pieces that are much injured and such as are rendered unserviceable, as well as all but the indispensable ammunition waggons, and the small arm ammunition waggons, should commence the retreat immediately.

The 12-pounder and howitzer batteries then in action should be next retired, and sent back to occupy the nearest suitable piece of ground. The rest of the batteries of the reserve close in upon them.

The divisional batteries continue with their divisions, and retire with the infantry, keeping always with the rear body of that Arm. When they reach the new positions, they relieve the 12-pounders, placed there in battery to carry them off; then again retire to the next position and act as before.

Each battery must see that a few of its ammunition waggons await its arrival at the nearest position, that it may not run short of ammunition.

If the enemy presses on powerfully, he should be beaten back by a short return to the offensive, for which purpose the cavalry and horse artillery should be employed.

As soon as the main body has been carried off from immediate contact with the enemy, a rear guard, formed of all Arms, and to which light foot and horse artillery should be attached, should take charge of the further protection of the retreat, according to the rules above given.

THE END.

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ERRATA.

Page 20, line 9 from bottom, *for* "last," *read* "greatest."

Page 33, line 13, insert between "lines" and "artillery" the word "of."

Page 78, line 8, *instead of* "unhampered," *insert* "in such positions as to render them difficult to overcome."

Page 140, line 4 from bottom, between "to" and "corps" *insert* the article "a."

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Being a Common-Place Book of PURE AND MIXED MATHEMATICS; together with the Elementary Principles of Engineering; designed chiefly for the use of Civil Engineers, Architects, and Surveyors.

BY OLINTHUS GREGORY, LL.D., F.R.A.S.

Third Edition, revised and enlarged by HENRY LAW, Civil Engineer.

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